Leica RM2245

Rotary Microtome

CE

Instruction Manual

Leica RM2245
V1.5 English - 11/2008
Always keep this manual with the instrument.
Read carefully before working with the instrument.

Leica
MICROSYSTEMS

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For the instrument serial number and year of manufacture, please refer to the identification label attached to the instrument.

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1.1 Symbols in the text and their meanings

Dangers, warnings and cautions appear in a gray box and are marked by a warning triangle ⚠.

Notes, i.e. important user information appear in a gray box and are marked by an information symbol ℹ.

(5) **Numbers in parentheses refer to item numbers in illustrations.**

RUN/ STOP **Function keys which must be pressed on the control panel are shown in the text in bold capital letters.**

1.2 Qualification of personnel

- The Leica RM2245 may be operated by trained laboratory personnel only.
- All laboratory personnel designated to operate the Leica instrument must read this instruction manual carefully and must be familiar with all technical features of the instrument before attempting to operate it.

1.3 Intended use of instrument

The Leica RM2245 is a semi-motorized rotation microtome with a separate control panel for creating thin sections of specimens of varying hardness for use in routine and research laboratories in the fields of biology, medicine and industry.

It is designed for cutting soft paraffin specimens as well as harder specimens, as long as they are suitable for being cut manually.

The Leica RM2245 is also suitable for IVD (in vitro diagnostics).

Any other use of the instrument is considered improper!

1.4 Instrument type

All information provided in this manual applies only to the instrument type indicated on the cover page.

An identification label indicating the instrument serial number is attached at the left side of the instrument.

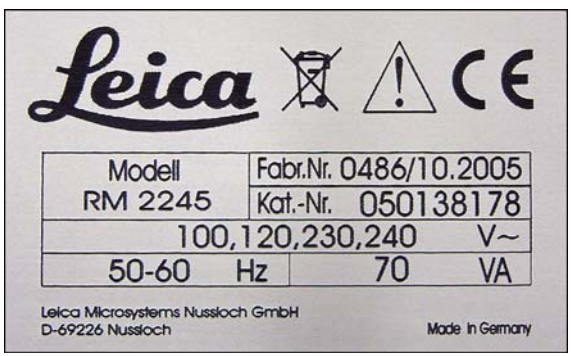


Fig. 1

Be sure to comply with the safety instructions and warnings provided in this chapter.
Be sure to read these instructions, even if you are already familiar with the operation and use of other Leica products.

2.1 Safety notes

This instruction manual contains important instructions and information regarding the operational safety and maintenance of the instrument.
The instruction manual is an important part of the product, which must be read carefully prior to startup and use and must always be kept near the instrument.

If additional requirements on accident prevention and environmental protection exist in the country of operation, this instruction manual must be supplemented by appropriate instructions to ensure compliance with such requirements.

This instrument has been built and tested in accordance with the safety regulations for electrical measuring, control, regulating and laboratory devices.

In order to maintain this condition and ensure safe operation, the operator must observe all the instructions and warnings contained in this instruction manual.

For current information about applicable standards, please refer to the CE declaration of conformity on our Internet site:

www. histo-solutions.com

The protective devices on both instrument and accessories may neither be removed nor modified. Only service personnel qualified by Leica may repair the instrument and access the instrument's internal components.

2.2 Warnings

The safety devices installed in this instrument by the manufacturer only constitute the basis for accident prevention. Primarily responsible for accident-free operation is above all the owner of the instrument and, in addition, the designated personnel who operates, services or cleans the instrument.
To ensure trouble-free operation of the instrument, make sure to comply with the following instructions and warnings.

Warnings – Safety instructions / warning labels attached to the instrument

- **Safety instruction labels on the instrument marked with a warning triangle indicate that the correct operating instructions (as described in this manual) must be followed when operating or replacing the instrument component bearing the label.**
  Failure to adhere to these instructions may result in an accident, personal injury, damage to the instrument or accessory equipment.

Warnings – Transport and installation

- **Once removed from the crate, the instrument may only be transported in an upright position.**
- **Never lift the instrument by the handwheels or the cassette clamp. Always remove the section waste tray before transporting the instrument.**
- **Caution! The voltage selector has been preset at the factory.**
  Before connecting the instrument to the mains power, please check that this setting complies with the local power requirements of your laboratory.
  The mains cable inlet is closed with an adhesive tape that indicates the actual voltage setting of the instrument upon arrival. Severe damage can be caused to the instrument if the voltage selector is set to an incorrect voltage!
- **When changing the voltage selector setting, ensure that the instrument is not connected to the mains power!**
- **Connect the instrument to a grounded power socket only using one of the power cables provided.**
- **Do not operate in rooms with explosion hazard.**
- **Exposure to extreme temperature changes between storage and installation locations and high air humidity may cause condensation inside the instrument. If this is the case, wait at least two hours before switching on the instrument. Failure to comply with this may cause damage to the instrument.**
- **The protective devices on both instrument and accessories must neither be removed nor modified.**

Personal safety precautions

- **When working with microtomes, personal safety precautions must always be taken. It is mandatory to wear work safety shoes, safety gloves, a mask and safety goggles.**

Warnings – Working at the instrument

- **Take care when handling microtome knives and disposable blades. The cutting edge is extremely sharp and can cause severe injury!**
- **Always remove the knife / blade before detaching the knife holder from the instrument. Always put the knives back into the knife case when not in use!**
- **Never place a knife anywhere with the cutting edge facing upwards and never try to catch a falling knife!**
- **Always clamp the specimen block BEFORE clamping the knife or blade.**
- **Lock the handwheel and cover the knife edge with the knife guard prior to any manipulation of knife or specimen clamp, prior to changing the specimen block and during all work breaks!**
- **ALWAYS turn the handwheel clockwise; otherwise, the brake will not work properly.**
- **Always take appropriate safety precautions when sectioning brittle specimens! Specimen may splinter!**
- **Ensure that liquids do not enter the interior of the instrument during work!**
- **Do not attempt to clamp, approach or orient the specimen during the retraction phase.**
  If a block is oriented during retraction, prior to the next section the block will advance by the retraction value PLUS the selected section thickness. This involves the risk that the specimen collides with the knife/blade!

Warnings – Cleaning and maintenance

- **Only authorized and qualified service personnel may access the internal components of the instrument for service and repair!**
- **Before each cleaning, switch off the instrument, disconnect the power plug, remove the knife holder completely and clean it separately.**
  Always remove the knife / blade before detaching the knife holder from the instrument.
- **Lock the handwheel before each cleaning!**
- **Do not use any solvents containing acetone or xylene for cleaning!**
- **Ensure that no liquids enter the interior of the instrument when cleaning!**
- **Do not turn the instrument on before it is completely dry!**
- **When using detergents please comply with the safety precautions of the manufacturer.**
- **Turn the instrument off with the mains switch and pull the mains plug, before replacing the fuses! Only use fuses of the same specification! For fuse specifications, refer to chapter 3.3 – "Technical data".**

2.3 Integrated safety devices

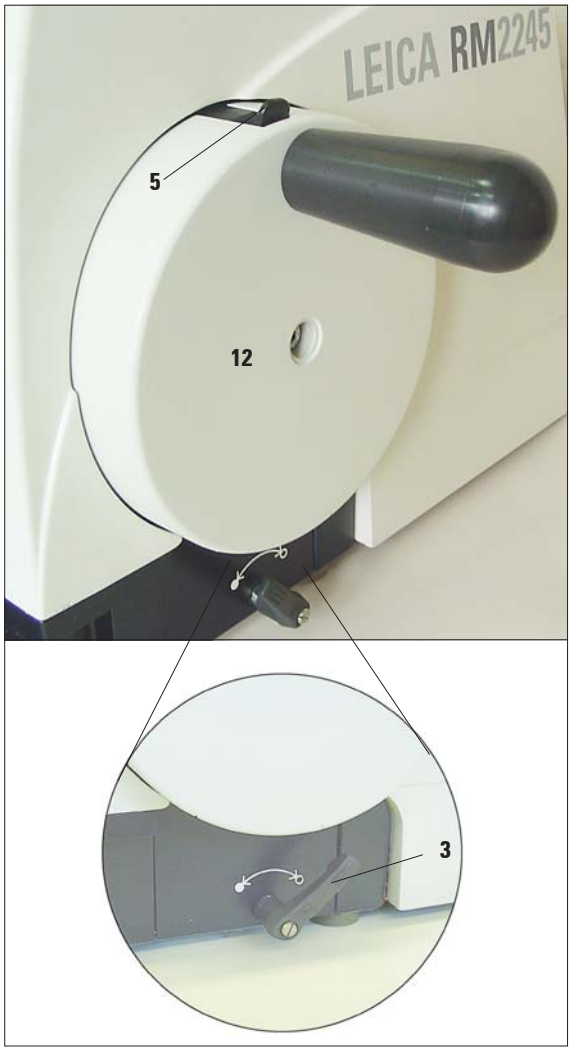


Fig. 2

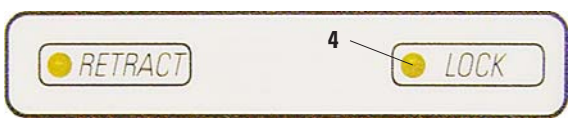


Fig. 3

Locking the handwheel

There are two ways of locking the handwheel (**12**):

Using the lever (**3**) on the right side of the microtome base plate, the handwheel can be braked in almost any position.

- To brake, rotate the lever in a counterclockwise direction to position ●.

Caution!
The braking lever (3) must be exactly in position ●, so that the handwheel brake is applied correctly.
If the lever is moved beyond this point, it is possible that the handwheel is no longer braked.

- To unlock the handwheel brake turn the lever (**3**) back to its original position. Position ○.

- To lock the handwheel, press the lever (**5**) outwards and continue to turn the handwheel slowly until it locks exactly in the 12 o'clock position.

In both cases the yellow LED (**4**) in the **LOCK** will be lit and the instrument cannot be started.

When using both brake systems at the same time, always move the lever (3) to position ○ first. Otherwise, it may be not be possible to release the lever (5).

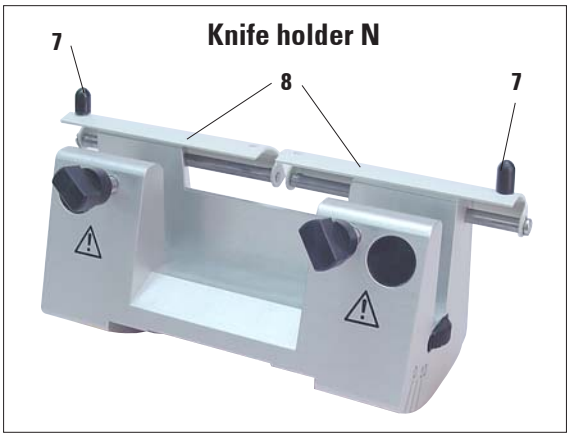


Fig. 4

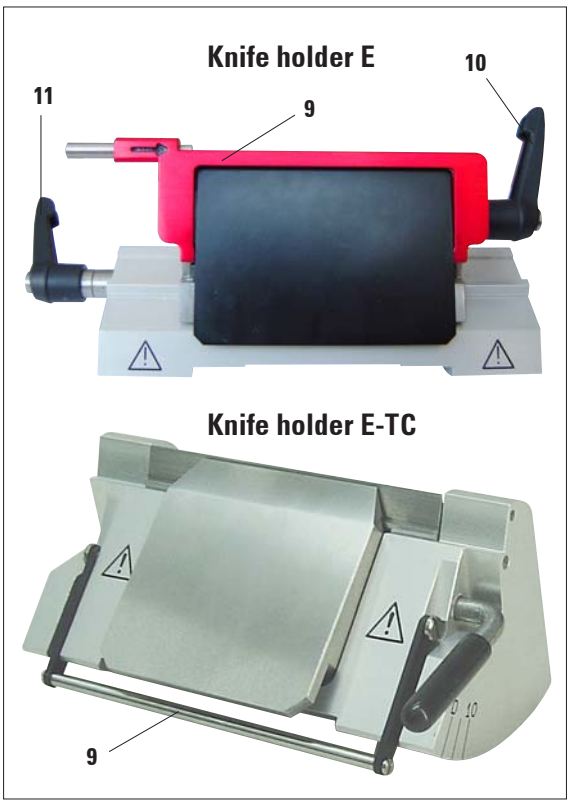


Fig. 5

Knife guard on the knife holder

Each knife holder is equipped with a tightly mounted knife guard (**8**, **9**). This makes it possible to cover completely the cutting edge in every knife or blade position.

Knife holder N/NZ

The knife guard (**8**) of the knife holder N/NZ can be easily positioned via the two handles (**7**) (Fig. 4).
To cover the knife edge, push both cover strips of the knife guard to the center.

Knife holder E/E-TC

The knife guard on knife holder E/E-TC consists of a red foldaway handle (**9**). To cover the cutting edge, fold the knife guard handle (**9**) upwards as illustrated in Fig. 5.

The clamping levers on the knife holder E are not interchangeable.
The two clamping levers (10, 11) must remain in the position shown at all times, as otherwise isolated malfunctions of the knife holder can occur.
Clamping lever for the blade (10) at the right, clamping lever for the lateral displacement (11) at the left.

3.1 Overview – instrument components

Leica RM2245

Instrument control panel
Handwheel locking mechanism
Directional specimen holder fixture with quick clamping system
Smooth-turning handwheel
Lever of handwheel brake
Knife guard on the knife holder
Separate control panel
Section waste tray
Clamping lever for lateral displacement
Knife holder E with lateral movement
Knife holder base

Fig. 6

Rear side of instrument

Fig. 7

3.2 Instrument specifications

The Leica RM2245 is a semi-motorized rotary microtome with a light-action handwheel.
The RM2245 supports two manual sectioning modes:
rocking mode and conventional sectioning with full turns of the handwheel.
All important controls are grouped in a user-friendly manner on a separate control panel with adjustable inclination.
Important information on the operating status of the instrument such as retraction, locking, trimming thickness, section thickness, and counters for the total number of sections and total thickness sectioned is displayed directly on the instrument.
The instrument features two independent handwheel locking systems for enhanced user safety.
It also features an adjustable retraction system.
The retraction value can be selected as required.
The motorized object head can be moved at two speeds (300µm/s and 900µm/s). The coarse drive speed and direction can be controlled via buttons at any time.
The minimum and maximum object head end positions are signaled visually and acoustically.
The thickness for trim and sectioning
modes can be programmed and stored independently.
A ruler integrated in the base of the microtome facilitates restoring a previous knife holder position.

3.3 Technical data

General

Approvals:	The instrument-specific marks are located next to the identification label.
Nominal supply voltages:	100 / 120 / 230 / 240 V AC ±10%
Nominal frequency:	50/60 Hz
Power draw:	70 VA
Protective class [Φ]:	I
Power fuses:	2 x T 1.0 A UL listed
Pollution degree: [Φ]:	2
Overvoltage installation [Φ]:	II
Maximum heat emission:	70 J/s
Operating temperature range:	+10 °C to +35 °C
Temperature range during storage:	+5 °C to +55 °C
Relative humidity:	max. 80% non-condensing
Humidity during storage:	< 80%

[Φ] according to IEC-1010, UL 3101, EN 61010

Dimensions and weight

Basic instrument

Width (including handwheel):	413 mm
Width (excluding handwheel):	300 mm
Depth (including waste tray):	618 mm
Height (total):	305 mm (with tray on the hood)
Working height (knife blade):	100 mm (measured from the base plate)
Working height (knife blade):	168 mm (measured from the table)
Weight (without accessories):	approx. 37 kg

Control panel

Width:	94 mm
Depth:	164 mm
Height:	50 mm
Height (in inclined position):	81 mm
Weight (net):	approx. 0.450 kg

Microtome

Sectioning thickness setting:		
Section thickness setting range:	0.50 - 100 µm	
Setting values:	from 0.50 µm - 5.0 µm	in 0.5 µm increments
	from 5.0 - 20.0 µm	in 1.0 µm increments
	from 20.0 - 60.0 µm	in 5.0 µm increments
	from 60.0 - 100.0 µm	in 10.0 µm increments
Trimming section thickness setting range:	1 - 600 µm	
Setting values:	from 1.0 - 10.0 µm	in 1.0 µm increments
	from 10.0 - 20.0 µm	in 2.0 µm increments
	from 20.0 - 50.0 µm	in 5.0 µm increments
	from 50.0 - 100.0 µm	in 10.0 µm increments,
	from 100.0 - 600.0 µm	in 50.0 µm increments
Object feed:	28 mm ±1 mm, feed motion via step motor	
Vertical stroke:	70 mm	
Maximum sectioning area w/o retraction:	65 mm without specimen orientation	
Maximum sectioning area with retraction:	60 mm	
Specimen retraction:		
in manual sectioning mode:	5 - 100 µm in 5 µm increments; can be turned off	
Electric coarse feed:	300 µm/s and 900 µm/s	
Repositioning of knife holder base		
north-south:	± 24 mm	
Maximum specimen size (W x H x D):	50 x 60 x 40 mm	
Specimen orientation		
horizontal:	8°	
vertical:	8°	

4.1 Standard delivery

The Leica RM2245 standard delivery includes:

1 Leica RM2245 basic instrument, without orientation	14 0501 38178
1 handwheel, complete	14 0501 38181
1 external control panel	14 0501 38179
1 section waste tray	14 0502 37931
1 set of power cables consisting of:	
1 power cable for Germany	14 0411 36958
1 power cable for USA/Canada/Japan	14 0411 36960
1 power cable for UK ST/BU F-5A	14 0411 36959
1 tool set – consisting of:	14 0502 37965
1 Allen key with handle, size 5	14 0194 04760
1 Allen key with handle, size 4	14 0194 04782
1 Allen key size 3	14 0222 04138
1 screwdriver 3x50, 186 long	14 0170 11568
1 bottle (50 ml) of oil for drives, type 405	14 0336 06086
2 micro-fuses 1.0 AT	14 6943 01001
1 brush w/magnet	14 0183 40426
1 dust protective cover	14 0212 30350
1 Instruction manual	14 0501 80001

The accessories ordered are included in a separate box. Carefully check the delivery against the packing list and the delivery note. Should there be any discrepancy, please contact the Leica selling unit handling your order.

4.2 Installation site requirements

- Stable, vibration-free laboratory bench with horizontal and even stage plate; practically vibration-free floor.
- No other instruments nearby which might cause vibrations.
- Room temperature permanently between +10 °C and +35 °C.
- Obstruction-free access to the handwheel.

Never operate the instrument in rooms with explosion hazard.

Setting up the instrument

Do not transport the instrument by holding it on the handwheel shaft, the object head or the cover!

- By holding the instrument (**5**) at the front by the baseplate, and at the rear by the recessed grip (Fig. 8), lift it out of the molded cushion (**6**) of the packaging and place it on a stable laboratory table.

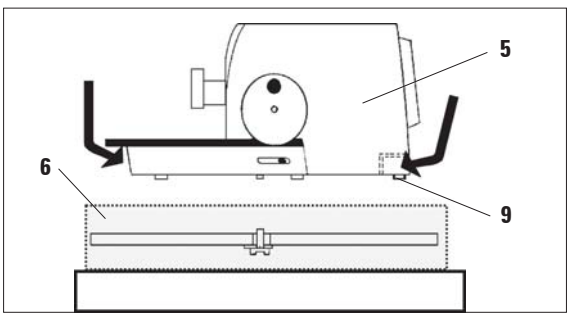


Fig. 8

- The two sliding elements (**9**) located on the rear of the base plate make it easier to move the instrument on the table.
- To move the instrument, hold it by the front of the base plate, lift it up gently and slide it on its slides.

4.3 Assembling the handwheel

The handwheel has to be assembled before attempting to use the instrument.
The necessary parts and tools can be found in the toolkit.

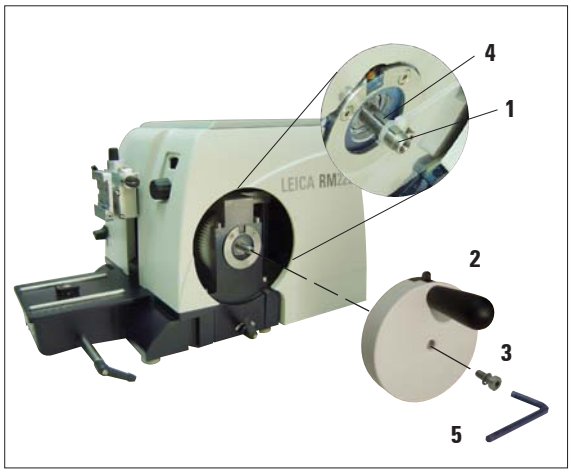


Fig. 9

The feather key (**4**) is loosely placed in the handwheel shaft (**1**) and fixed in place with a tie-rap during transport.

- Remove the cable tie.
  Caution!
  Make sure not to lose the feather key!
- Place the handwheel (**2**) on the handwheel shaft (**1**) as shown.
- Tighten the screw (**3**) located in the center hole of the handwheel with an Allen key size 4 (**5**).
- Remove the cover foil from the self-adhesive cover disk (**6**) and fix the cover disk on the handwheel.

4.4. Electrical connections

The instrument MUST be connected to a grounded power socket. Use only the power cable provided that matches the power supply (outlets) of the country of use. Do not use an extension cable!

Checking the voltage

The Leica RM2245 can be connected to various electrical power grids (depending on voltage and frequency) and, for this reason, is always delivered with a set of various power cables.

New instruments are factory-set to 230 volts. This is documented by a yellow label (**230 VOLT**) on the rear of the instrument, which covers the power switch and power socket.

Before connecting the instrument to the power supply, be absolutely certain to check that the voltage selector is set to the voltage in use in your area!
Severe damage can be caused to the instrument if the voltage selector is set to an incorrect voltage!
Never change the setting of the voltage selector while the instrument is connected to the power supply.

Checking the voltage (continued)

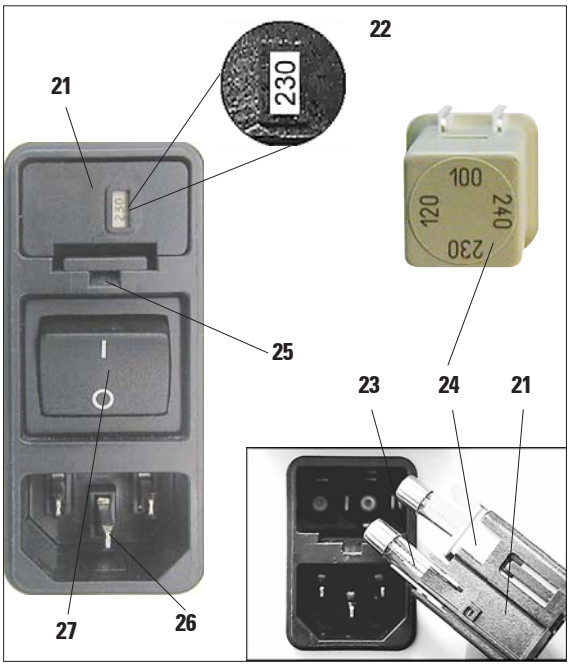


Fig. 10

The voltage selector is located above the main power switch, on the left-rear side of the instrument (Fig. 10). The voltage setting is displayed in the viewing window (**22**).

- Insert a small screwdriver into the cutout (**25**) and carefully pry out the insert.
- Remove the voltage selector housing (**21**) together with the fuses (**23**). Remove the voltage selector block (**24**) (white) and insert it again such that the correct local voltage is displayed in the viewing window (**22**).
- Reinsert the voltage selector housing with the block and fuses and push it in until it engages (audible click).

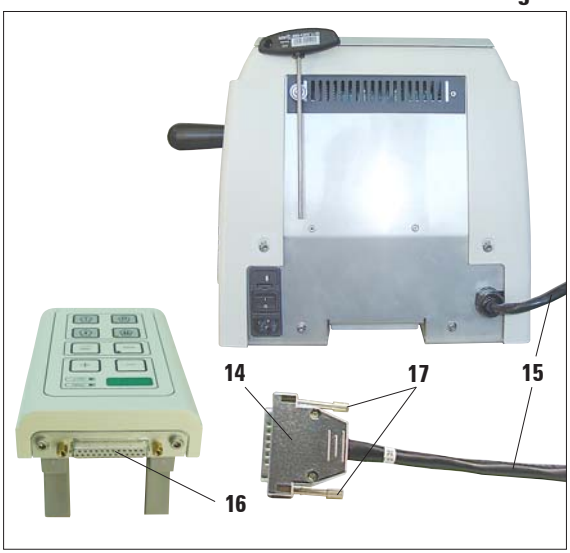


Fig. 11

Connecting the control panel

The connecting cable (**15**) of the control panel is fixed to the microtome. It may not be disconnected.

- Insert the plug (**14**) of the connecting cable (**15**) into the connecting jack (**16**) on the rear of the control panel.
- To fasten the plug, tighten the two screws (**17**).

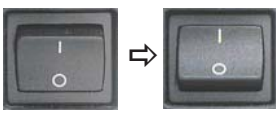
4.5 Switching on the instrument

Exposure to extreme temperature changes and high air humidity may cause condensation to form inside the instrument.
After transporting, please wait at least 2 hours to allow the instrument to adopt the ambient temperature before turning it on!
Failure to comply with this may cause damage to the instrument.

Connecting the power supply

- Before connecting the power cable, make sure that the power switch (**27**) on the rear of the instrument is switched to "**O**" = **OFF**.
- Various country-specific power cables are provided with the instrument. Make sure that the power cable used has the correct plug for the power socket.
- Insert the connector of the power cable into the connection socket (**26**) and plug the power plug into the power socket.

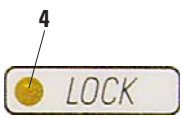
When turning the instrument on with the mains switch, do not press any of the buttons of the control panel!



Turn the instrument on with the mains switch at the rear.
This is followed by a beep.
The instrument initializes.

The software version is displayed in the 4-digit display for approx. two seconds. Then the display reads "**0000**". After the microtome is switched on, the display fields and LEDs of all activated functions are lit up on the instrument's control panel and display field.

The three-digit LED display indicates the last value set for the section thickness or trimming section thickness, depending on which setting was last activated. This is indicated simultaneously on the control panel and microtome. The LED of the active mode (here the section thickness) is illuminated in green.

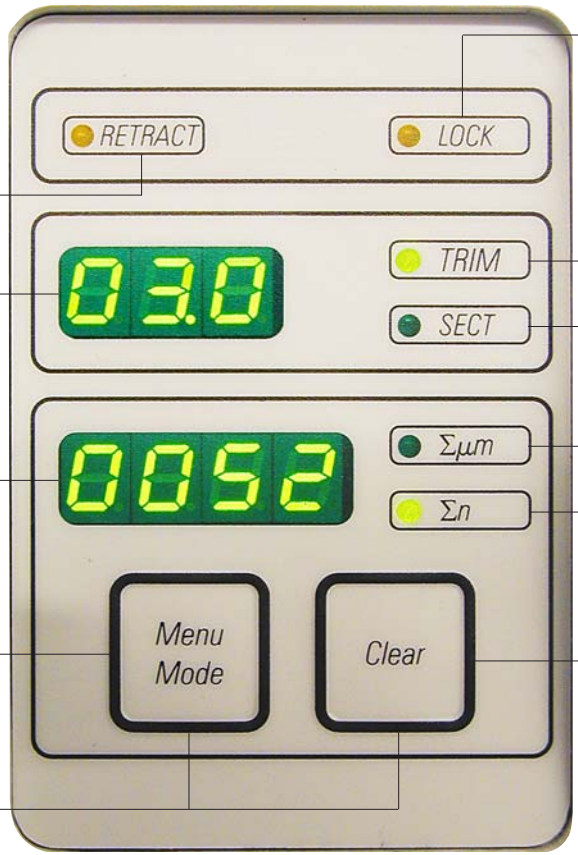


If the yellow LED in the **LOCK** field (**4**) of the control panel is lit, the mechanical handwheel lock or the handwheel brake (Item 3 in Fig. 3) is activated.
The instrument cannot be started as long as the LED is lit.

5.1 Operating elements and their functions

The operating functions of the microtome are divided between a control panel and a display unit on the microtome.
A control panel on the instrument displays the current operating mode as well as various settings. All operating functions are centrally located in the separate control panel. All keys and displays are logically arranged in functional groups and easily identifiable.

5.1.1 Instrument control panel



RETRACT LED
Lights up during specimen retraction.

Three-digit display for displaying section thickness/trimming section thickness.

Four-digit display of the section counter.

MENU MODE button
Switches between section thickness sum and section counter.

MENU MODE + CLEAR pressed simultaneously switches to the setting of the retraction value.

LED - LOCK
Lights up when handwheel locking mechanism is activated.

Green LED
Lights up when trimming mode is activated.

Green LED
Lights up when sectioning mode is activated.

Green LED
Section thickness sum, indicates the total for all sections.

Green LED
Section counter displays the number of all sections.

CLEAR button
Resets section counter and section thickness sum back (to 0).

Fig. 12

5.1.2 Control panel

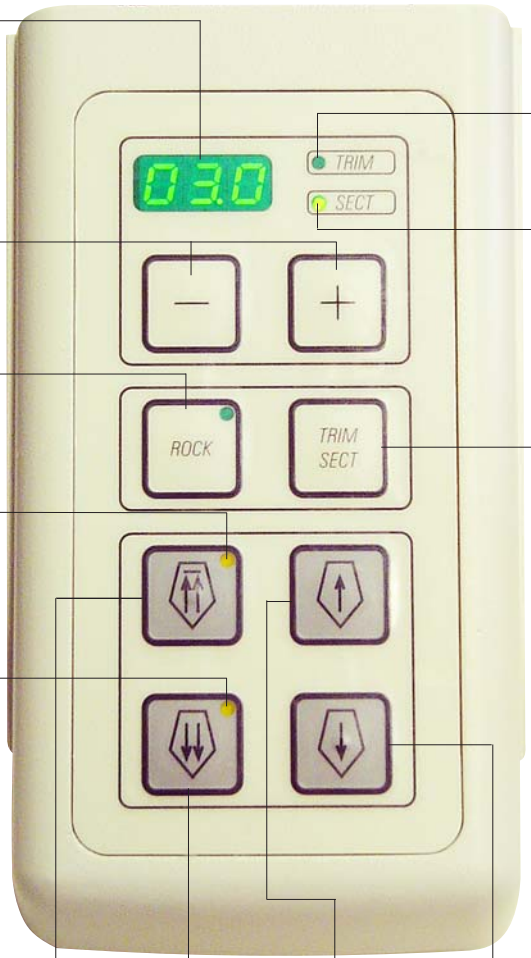

Three-digit display for section thickness/ trimming section thickness
Buttons for setting the section thickness/trimming section thickness
Button to enable and disable rocking mode.
Yellow LED Flashes during coarse feed backwards; lights up when rear end position is reached.
Yellow LED Flashes during coarse feed forwards; lights up when front end position is reached.
LED TRIM (green) Lights up when trimming mode is activated
LED SECT (green) Lights up when sectioning mode is activated
TRIM/SECT button For switching between sectioning mode and trimming mode.
TRIM
SECT
ROCK
TRIM SECT
Coarse feed buttons
Trimming mode:
Coarse feed backward fast
Coarse feed forward fast
Coarse feed forward slow
Coarse feed backward slow
Sectioning mode:
Multiple step backward
Multiple step forward
Single step forward
Single step backward

Fig. 13

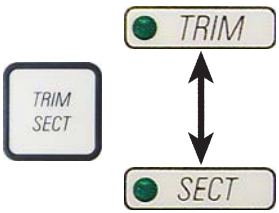
5.1.3 Display and control elements

Fig. 14

Three-digit display

This display is located both on the instrument and on the control panel.
If the **SECT** LED is lit up, the display shows the section thickness setting in µm.
If the **TRIM** LED is lit up, the display shows the trimming section thickness setting in µm.

Selecting the sectioning and trimming mode



To switch between sectioning mode and trimming mode, press the **TRIM SECT** button. Whenever the button is pressed, the display toggles between **SECT** and **TRIM**.
In the **SECT** display, the sectioning thickness in the range from 0.50 to 100.0 µm is shown, and in the **TRIM** display, the trimming section thickness between 1.0 and 600 µm is displayed.

Setting the section thickness/trimming section thickness

Adjust these settings using the [+] - [−] keys on the control panel.

Section thickness setting range: 0.50 - 100 µm

Setting values:	from 0.5 µm - 5.0 µm	in 0.5 µm increments
	from 5.0 - 20.0 µm	in 1.0 µm increments
	from 20.0 - 60.0 µm	in 5.0 µm increments
	from 60.0 - 100.0 µm	in 10.0 µm increments

Trimming section thickness setting range: 1 - 600 µm

Setting values:	from 1.0 - 10.0 µm	in 1.0 µm increments
	from 10.0 - 20.0 µm	in 2.0 µm increments
	from 20.0 - 50.0 µm	in 5.0 µm increments
	from 50.0 - 100.0 µm	in 10.0 µm increments
	from 100.0 - 600.0 µm	in 50.0 µm increments.

Coarse feed functions

The electric coarse feed at two speeds is used for a rapid movement of the specimen towards and away from the knife.
Press the buttons with the double arrow for a speed of 900 µm/s; for 300 µm/s please use the buttons with a single arrow.
In sectioning mode the coarse drive can be used in **STEP** mode, or with continuous feed. Continuous feed is the default setting.

Sectioning mode

Button functions in STEP mode

Multiple step backward

Single step backward

Multiple step forward

Single step forward

In sectioning mode the user can select between STEP function (step-by-step specimen feed) and continuous specimen feed.

When continuous feed is selected, the coarse feed buttons have the same functions as in trimming mode. The **STEP** function is useful for careful step-by-step approximation of the specimen towards the blade.

How to activate the **STEP** function:

- Switch the instrument on while holding the button [+] on the control panel. (Likewise, to deactivate switch the instrument on while pressing the button [−].) While the instrument is initializing, hold the [+] button until the software version number is no longer displayed (ensure that version number 2.1 was displayed).

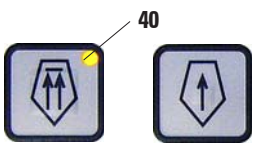
This feature is only available in sectioning mode in version 2.1 or higher. If you have an earlier software version, please contact Leica Service.

- **Press TRIM/SECT** [TRIM/SECT] button and select sectioning mode (LED **SECT** lit).
- When pressing a slow-speed coarse feed button (with an arrow) in **STEP** mode, the specimen moves towards or away from the specimen by the value indicated on the display (single step).
- By short activation of a double-arrow coarse feed button, a single step is also effected in the appropriate direction.
- Longer activation of the double-arrow coarse feed button effects a repeated feed motion for as long as the button is pressed.

Trimming mode

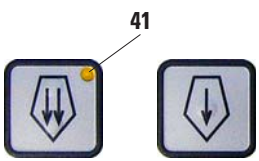
In the trimming mode, the coarse feed buttons operate a continuous movement as long as the button is held down. The double-arrow button for rapid coarse feed backward movements has a lock-in function.

Backwards coarse feed



- To start the rapid backwards movement (away from the blade) press the button [⇑].
  After the [⇑] button is pressed, the object head is moved to the rear end position.
- To stop the movement, press any of the four coarse feed buttons.
- The yellow LED (**40**) in the button flashes while the object head is in motion, and remains lit continuously when the rear end position is reached.
- Press the button to start the slow backwards movement. The travel continues as long as the button is held depressed.

Forward coarse feed



- Press the appropriate button to start a rapid or slow forward movement. The travel continues as long as the button is held depressed.
- During the forwards movement, the yellow LED (**41**) in the button flashes. When the front end position is reached, an acoustic signal is heard and the LED stops flashing and remains lit.

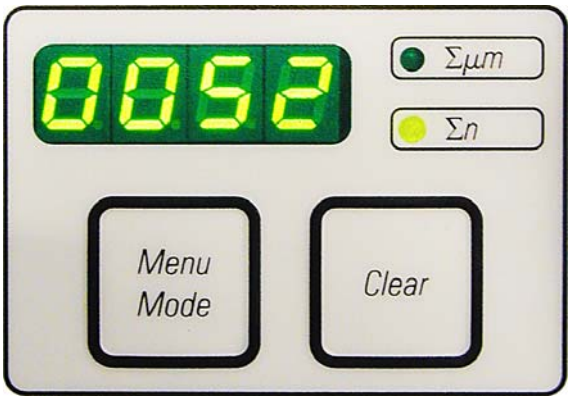


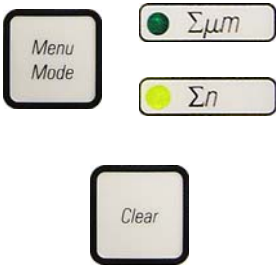
Fig. 15

Four-digit display on the instrument

The four-digit display is adjustable.

When the **Σ µm** LED is lit, the display shows the sum of the section thicknesses in µm for all sections completed since the instrument was switched on.
(Section thickness sum)

When the **Σn** LED is lit, the display shows the number of all previously completed sections.



- To change the display mode, push **MENU MODE** until the LED of the desired mode is illuminated.
- Press **CLEAR** to reset section thickness sum or section number.
- This will only reset the currently displayed value.

Caution!
When the instrument is switched off using the main power switch, both values (section thickness sum and section number) are erased from memory.

Specimen retraction

To prevent damage to the blade and specimen, the specimen is moved away from the blade during the return motion to the upper home position.

The retraction value can be selected in 5 µm increments between 5 and 100 µm. Specimen retraction is set to 10 µm at the factory.

Specimen retraction can be disabled if required.

The selected setting is maintained when the instrument is turned off.

Configuring the retraction settings

- To call up the retraction settings, press the **MENU MODE** and **CLEAR** buttons simultaneously.

- The current set value is displayed as a **three-digit number** in the four-digit display (e.g. "**025**" = 25 µm).

- Select the desired retraction value.
  The retraction value can be adjusted in increments of 5 µm to a maximum of 100 µm using the [+] - [–] buttons on the control panel.

- To exit the retraction settings, press **MENU MODE**.
  A retraction movement takes place by the newly selected value after each section.

- While the specimen is in retraction, the yellow LED on the **RETRACT** display (**4**) lights up.

Switching off the specimen retraction

- To call up the retraction settings, press **MENU MODE** and **CLEAR** simultaneously.

- To switch off retraction, press the [–] button on the control panel until the display indicates "**OFF**".

- To exit the retraction settings, press **MENU MODE**.
  When retraction is switched off, the specimen is not retracted.

  The yellow LED (**4**) of the **RETRACT** indicator does not light up.

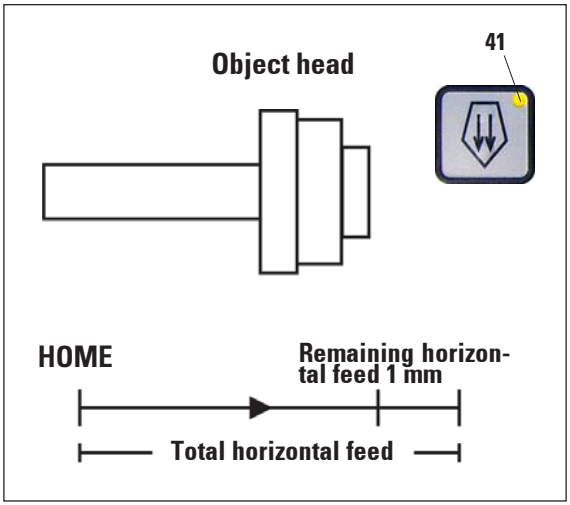


Fig. 16

The visible and audible remaining feed indication feature informs the user during trimming and sectioning when a remaining feed of approximately 1 mm is available before the front limit is reached.

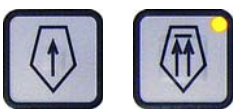
The yellow LED (**41**) in the **COARSE FEED** button lights up from the beginning of the remaining feed.

In addition, an acoustic signal is heard for approx. 2 seconds.

From this point on, a remaining feed of approx. 1 mm is available.

In the remaining feed area, no more object feeding to the knife is possible using the coarse feed buttons.

- You can continue with your working routine.
  The yellow LED (**41**) in the **COARSE FEED** button lights up (Fig. 16).
- Feed stops once the front end position has been reached; further sectioning is no longer possible in that position.



- You can continue to work on the specimen by pressing the corresponding coarse feed button in the rear end position (**HOME**) and continuing with sectioning.

Caution!
To do so, you must press TRIM/SECT to switch to trimming mode, as otherwise, you cannot use the coarse feed.

If the object head is already in the remaining feed range when the instrument is switched on, an additional acoustic signal is heard after the software version is displayed.

- You can continue to work on the specimen by moving it back a short distance using the coarse feed buttons (set trimming mode!).
- The **STEP** function is disabled in the remaining feed range.

Directional fixture for specimen clamps

In the quick clamping device of the directional specimen holder fixture, all specimen clamps available as optional accessories can be used (implemented).

The object orientation allows for simple position correction of the specimen surface when the specimen is clamped into place.

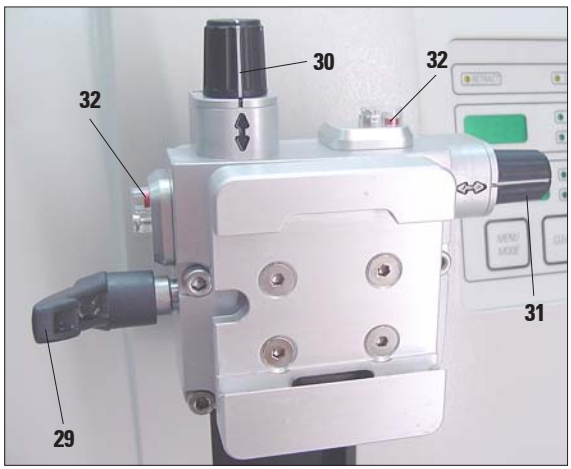


Fig. 17

Display of the zero position

For better display of the zero position, the orientation has two red indicators (**32**).

When both indicators are visible and both setscrews are in zero position at the same time (notch point, white marking on "↕"), the specimen is in zero position.

When the large standard specimen clamp (50 x 55 mm) is used, the specimen orientation of 8° in north-south direction is no longer possible.
The usable angle is only about 4° in this case.

The directional specimen holder fixture may be exchanged for a non-directional fixture (optional accessory).

Orienting the specimen

Specimen blocks must not be oriented during the retraction phase!
If a block is oriented during retraction, the block will advance by the retraction value PLUS the selected section thickness before the next section.
This may cause damage to both specimen and knife!

- Raise the object head to the upper end position and activate the handwheel lock.
- To release the clamp, turn the eccentric lever (**29**) forwards.
- Turn setscrew (**30**) to orient the specimen in north-south direction. Turn setscrew (**31**) to orient the specimen in east-west direction.

  Each complete turn of the screw inclines the specimen by 2°. A total of 4 complete turns = 8° are possible in every direction. The accuracy is approximately ± 0.5°.

  For ease of estimation, there is a white marking on the handle and a notch point that is noticeable during turning.
- To lock the current orientation, turn the eccentric lever (**29**) backwards.

Fig. 18

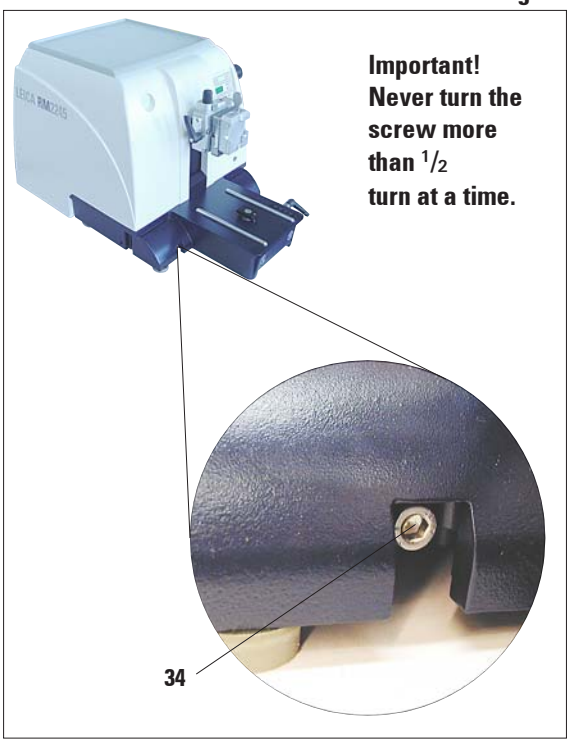


Fig. 19

Fine adjustment of the force balance

If another accessory of a different weight is mounted on the object head (**33**), you must check whether it is necessary to readjust the force balance.

Checking the correct setting:

- Attach the new accessory and clamp the specimen.
- Set the object head to half the height of the vertical travel range by turning the handwheel (Fig. 18).

If the object head remains in this exact position, the setting is correct.

If the object head moves, i.e. it is raised or lowered, fine adjustment is necessary.

Failure to adjust the force balance may result in injury while working.

The force balance is adjusted using the screw (**34**), which can be accessed by removing the section waste tray on the bottom of the base plate of the microtome. Use the Allen key provided, size 5 (with handle!) for the adjustment.

- If the object head moves **downwards**, turn the screw approx. $^1/_2$ turn **clockwise**.
- If the object head moves **upwards**, turn the screw (**34**) approx. $^1/_2$ turn **counterclockwise**.
- Continue this procedure until the object head no longer moves once released.

5.2 Inserting the knife holder

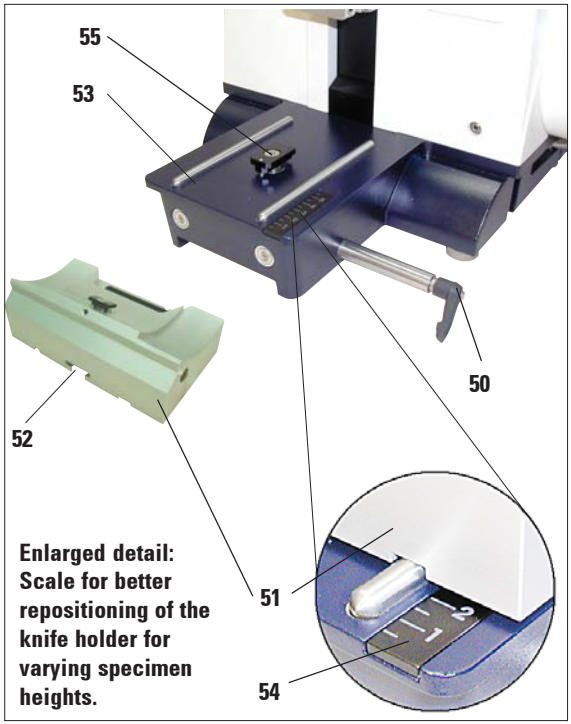


Fig. 20

Setting up the knife holder base

- Release the clamping lever (**50**) by rotating it counterclockwise.
- Insert the knife holder base (**51**) using the notch (**52**) on the bottom into the T-piece (**55**) of the microtome base plate (**53**).
- To secure the knife holder base, turn the clamping lever (**50**) clockwise.

The knife holder base (**51**) can be moved back and forth on the microtome base plate. This allows bringing the knife holder to optimal sectioning position in relation to the specimen.

There is a scale (**54**) on the right side of the microtome base plate. This enables faster and better positioning of the knife holder at the specimen if various combinations of standard specimens and specimen holders are used. The rear edge of the knife holder base (**51**) functions as the scale reference.

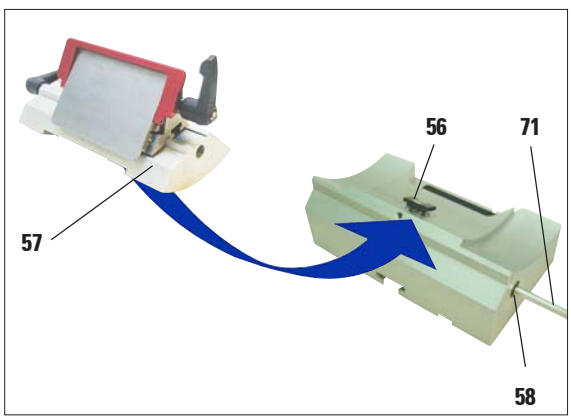


Fig. 21

Inserting the knife holder

- Loosen the screw (**58**) using an Allen key size 4 (**71**) until the knife holder (**57**) can be moved.
- Place the knife holder (**57**) with the underside groove onto the T-piece (**56**) of the knife holder base (**51**).
- To clamp, retighten the screw (**58**).

5.3 Inserting the universal cassette clamp

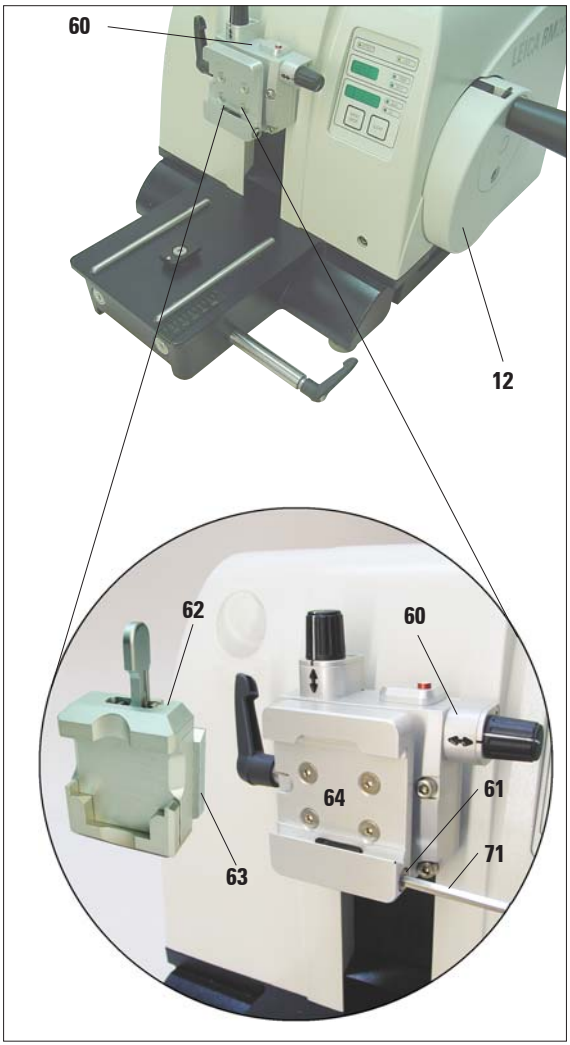


Fig. 22

There are two versions of the specimen holder, one with and one without specimen orientation, which are interchangeable.
The object orientation allows for simple position correction of the specimen surface when the specimen is clamped into place.

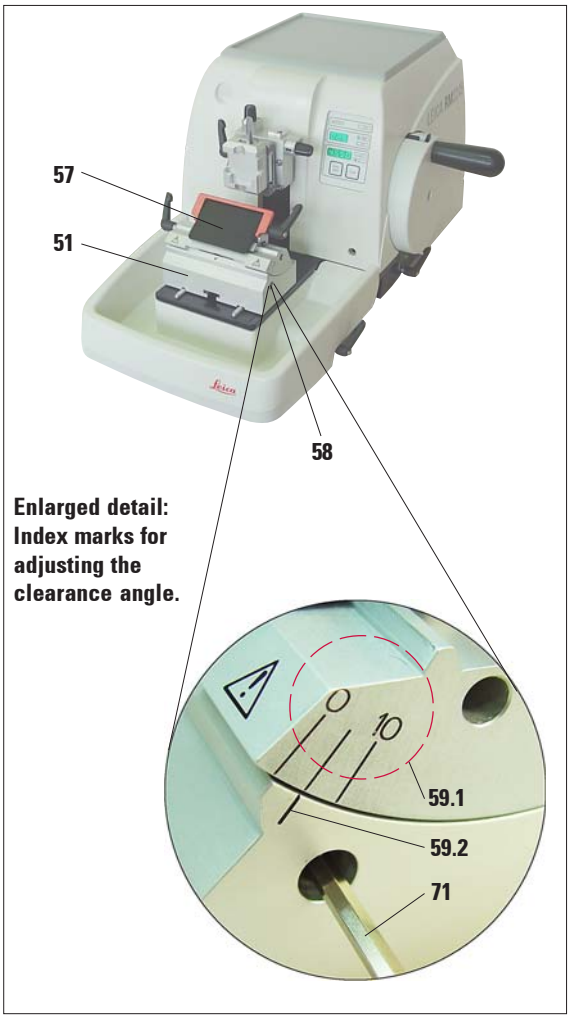
You can use the quick clamping system (**64**) to hold all available accessory specimen clamps (for more information, see Chapter 6 "Optional accessories").

To do so, proceed as follows:

- Move the object head (**60**) to the upper end position by turning the handwheel (**12**) and engage the handwheel lock.
- To release the clamping system, turn the screw (**61**) of the quick clamping system (**64**) counterclockwise using an Allen key size 4 (**71**).
- Push the guide (**63**) of the universal cassette clamp (**62**) from the left into the quick clamping system (**64**) as far as it will go.
- To clamp the cassette clamp turn the screw (**61**) clockwise as far as it will go.

Since all stage clamps available as accessories are equipped with the same kind of guide on the back, they are inserted in the same way described here using the example of the cassette clamp.

5.4 Adjusting the clearance angle



Enlarged detail: Index marks for adjusting the clearance angle.

Fig. 23

- The index marks (0 °, 5 ° and 10 °) for adjustment of the clearance angle (**59.1**) are located on the right side of the knife holder (**57**).
- There is also an index mark (**59.2**) on the right side of the knife holder basis (**51**) which serves as a reference point when adjusting the clearance angle.
- Loosen the screw (**58**) using an Allen key size 4 (**71**) until the knife holder (**57**) can be moved.
- Move the knife holder until the index mark of the desired clearance angle coincides with the reference line on the knife holder base.

  Example:
  Enlarged detail showing a clearance angle setting of 5 °.

The recommended clearance angle setting for knife holder E is approx. 5 °.

- Hold down the knife holder in this position and retighten the screw (**58**) for clamping.

5.5 Clamping the specimen

Always clamp the specimen block BEFORE clamping the knife. Lock the handwheel and cover the knife edge with the knife guard prior to any manipulation of knife or specimen, prior to changing the specimen block and during all work breaks!

- Rotate the handwheel until the specimen clamp is in the uppermost position.
- Activate the handwheel lock by allowing the handwheel handle to lock in place and then activate the brake.
- Insert a specimen block into the specimen clamp.

A detailed description for inserting the specimen into various specimen clamps and specimen holders is provided in Chapter 6, "Optional accessories".

5.6 Clamping the knife / disposable blade

Be very careful when handling microtome knives or blades. The cutting edge is extremely sharp and can cause severe injury!

- Carefully insert knife or disposable blade into the knife holder and clamp.
- Make sure that the blade is clamped parallel to the upper edge of the pressure plate.
  (For more information see Chapter 6.2.2, Fig. 36)

A detailed description for inserting the blade or the knife into the individual knife holders is provided in Chapter 6, "Optional accessories".

5.7 Cutting into the specimen (trimming)

- Use the **TRIM/SECT** key to select the trim mode.
- Set the desired trim section thickness.
- Release the handwheel lock and the brake.

- In **TRIM** mode, use the coarse feed buttons to move the sample against the knife/blade.

- Trim the sample by turning the handwheel
  or
- Press the **ROCK** button (LED (**41**) in button is lit) to select **ROCK** mode. Trim the specimen by rocking the handwheel back and forth.
- Terminate trimming when the desired sectioning surface and depth have been reached.

5.8 Sectioning

Always turn the handwheel evenly in clockwise direction; otherwise, the brake will not work properly. The rotation speed of the handwheel must be adapted to suit the hardness of the specimen. For harder specimens, use a slower speed.

Always use a different area of the cutting edge for trimming and sectioning.

To do so, laterally displace the blade or knife in the knife holder.

- When using the knife holder E with lateral movement, it is sufficient to move the knife holder sideways.

- Use the **TRIM/SECT** key to select the sectioning mode.
- Adjust the appropriate sectioning thickness or verify the selected value.
- Select conventional sectioning or **ROCK** mode.

- To section the specimen, turn the handwheel clockwise smoothly or rock it back and forth if in **ROCK** mode.
- Pick up the sections and mount them on microscope slides.

5.9 Changing the specimen or interrupting sectioning

Lock the handwheel and cover the knife edge with the knife guard prior to any manipulation of knife or object head, as well as prior to changing the specimen block and during all work breaks!

- Raise the specimen to the upper end position and activate the mechanical handwheel lock.
- Cover the sectioning edge with the knife guard.
- Remove the specimen from the specimen clamp and mount a new sample to continue.
- Before cutting into a new specimen, move the object head back to the rear end position.

5.10 Finishing daily routine

- Raise the specimen to the upper end position by turning the handwheel and engage the handwheel lock.

Always remove the knife / blade before detaching the knife holder from the instrument.
Always put the knives back into the knife case when not in use!
Never place a knife anywhere with the cutting edge facing upwards and never try to catch a falling knife!

- Remove the blade from the knife holder and insert it in the receptacle at the bottom of the dispenser, or remove the knife from the knife holder and put it back in the knife case.
- Remove the specimen from the specimen clamp.
- Push all section debris into the section waste tray and empty the tray.
- Switch the instrument off at the main power switch.
- Clean the instrument (see Chapter 8.1).

6.1 Assembly for fixture for specimen clamps

Depending upon the purchase order, the basic instrument is delivered with the directional or rigid fixture for specimen clamps which must be assembled first. All specimen clamps available as accessories can be used in both fixtures for specimen clamps.
Before assembling the fixture for specimen clamps, activate the mechanical handwheel lock!

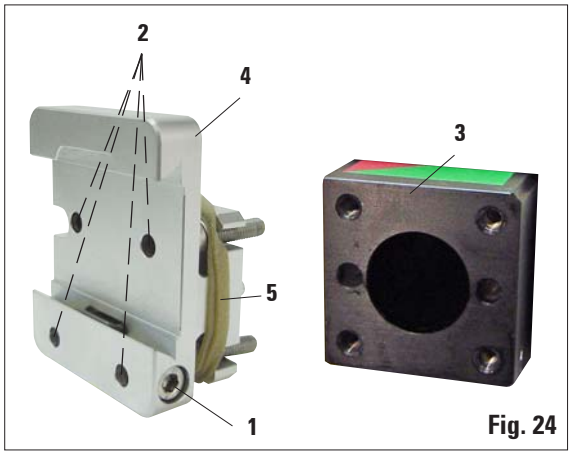


Fig. 24

6.1.1 Rigid fixture for specimen clamps

- Screw the rigid fixture for specimen clamps (**4**) onto the object head (**3**):
  Remove the screw (**1**), attach the fixture for specimen clamps (**4**) onto the object head (**3**) from the front and tighten the screws (**2**) with an Allen key size 3.
  Next, insert the screw (**1**) from the side and briefly tighten it with an Allen key size 4.

Remove the rubber ring only after attaching the object head!

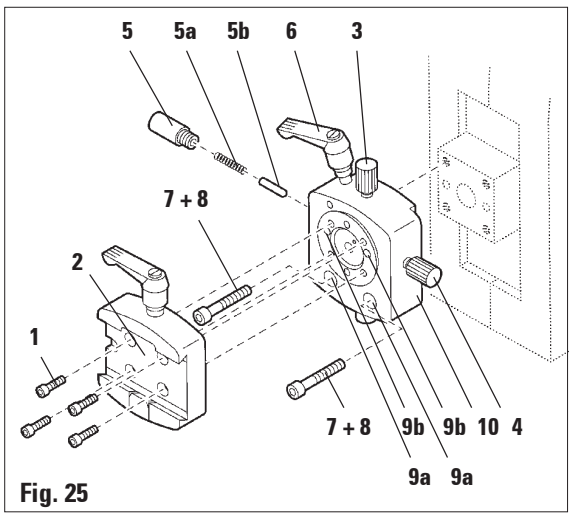


Fig. 25

- Finally, place the dovetail holder (**2**) and fasten by screwing in the 4 screws (**1**) using an Allen key size 3.

6.1.2 Directional fixture for specimen clamps

- Loosen the eccentric bolt (**6**) by turning it counterclockwise.
- Completely unscrew the thrust piece (**5**) with a flat-tip screwdriver and pull it out with spring (**5a**) and pin (**5b**).
- Completely unscrew the setscrews (**3**) and (**4**).
- Attach the directional fixture for specimen clamps as shown.
- Insert the screws (**7+8**) in the bore (2 screws (**8**) are accessible through the bore (**9a**)) and evenly screw them in using an Allen key size 3.
- Insert the spring (**5a**) and pin (**5b**) with the flatter side into the thrust piece (**5**). Completely screw in the thrust piece with a flat-tip screwdriver.
- Completely screw in the setscrews (**3+4**).

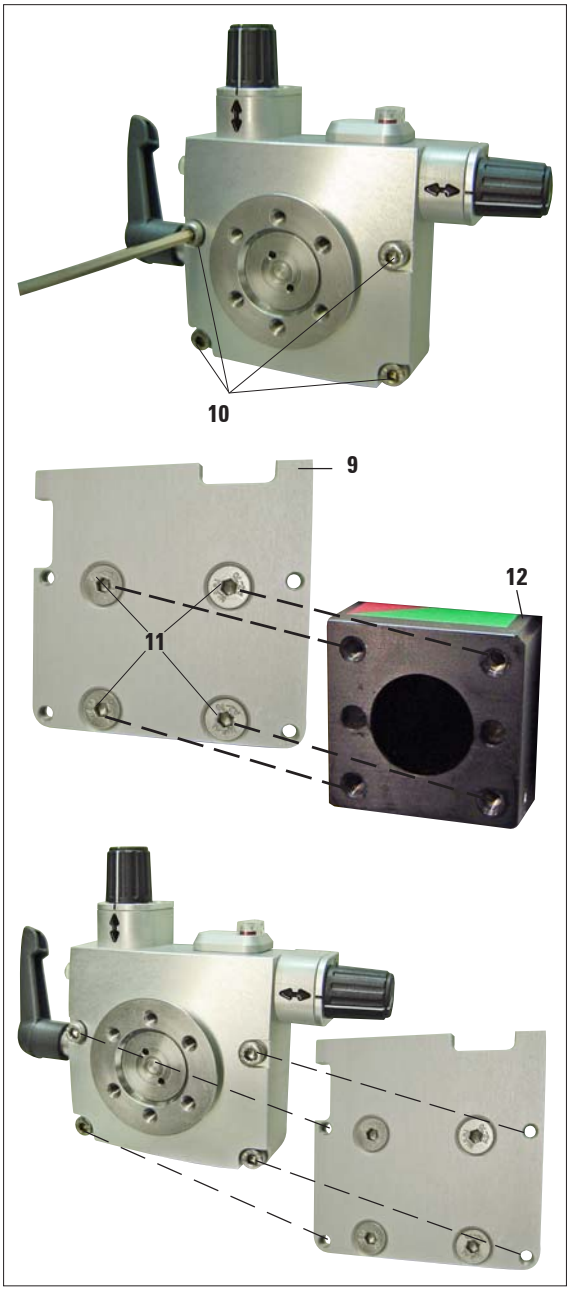


Fig. 26

6.1.3 Fine-directional fixture for specimen clamps

- Before the fine-directional fixture for specimen clamps can be mounted, loosen 4 screws (**10**) (Allen key size 3) and carefully remove the fixture for specimen clamps from the baseplate (**9**).

- Using the 4 supplied screws (**11**) and the Allen key size 3, fasten the baseplate to the object head (**12**).

- Now, screw the fine-directional fixture for specimen clamps with the 4 screws (**10**) and the Allen key size 3 onto the object head.

If the fine-directional fixture for specimen clamps is not used, retain the baseplate and 4 screws (11) together with the fine-directional fixture for specimen clamps!

Fig. 27

6.1.4 Quick clamping system

It is used as specimen holder for use with the fine-directional fixture for specimen clamps with zero point indicators or the directional fixture for specimen clamps.

- Screw the 4 screws (**13**) into bore A with an Allen key size 2.5 and tighten them.

6.2 Specimen clamps and holders

All specimen clamps available as accessories can be integrated into either the directional or non-directional specimen holder fixture.

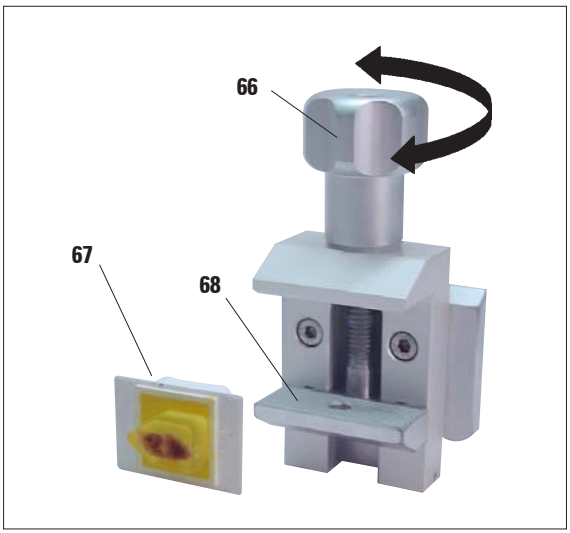


Fig. 28

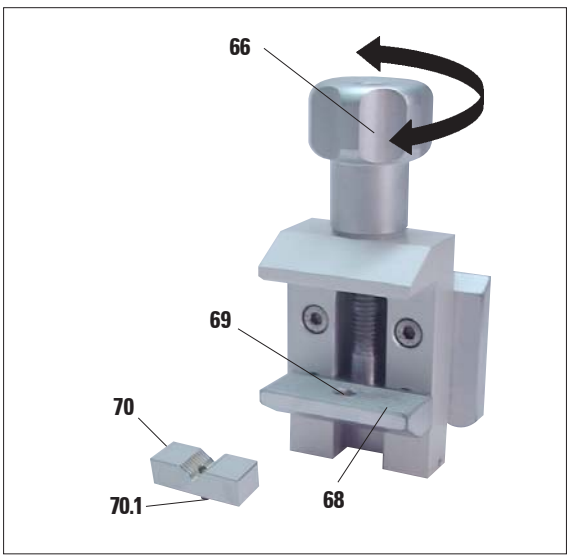


Fig. 29

6.2.1 Standard specimen clamp

The standard specimen clamps are available in two sizes: 40 x 40 mm and 50 x 55 mm.
They are designed for direct clamping of rectangular blocks. In addition, they accommodate the foil clamps.

- Turn the knurled screw (**66**) counterclockwise to move the movable jaw (**68**) downward.
- Mount the sample (**67**) as required.
- Turn the knurled screw (**66**) clockwise to move the movable jaw upward against the fixed jaw to securely clamp the sample.

6.2.2 Vee insert

The vee insert (**70**) is mounted in the hole provided in the lower movable jaw of the standard specimen clamp.
This makes it possible to clamp round specimens in the standard specimen clamp.

- Turn the knurled screw (**66**) counterclockwise to move the movable jaw (**68**) downward.
- Insert the pin (**70.1**) of the vee insert (**70**) in the hole (**69**) of the lower jaw (**68**).
- Mount the sample as required.
- Turn the knurled screw (**66**) clockwise to move the movable jaw with the vee insert upward against the fixed jaw to securely clamp the sample.

6.2.3 Foil clamp type 1

The foil clamp type 1 is appropriate both for clamping very small foil pieces and flat, angular samples. It is mounted in the standard specimen clamp.

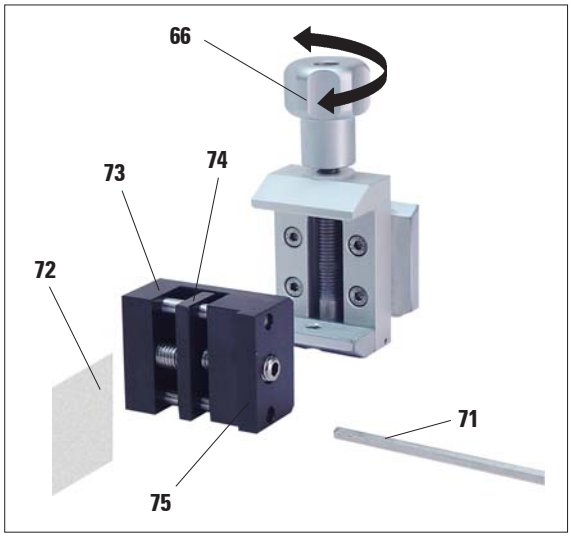


Fig. 30

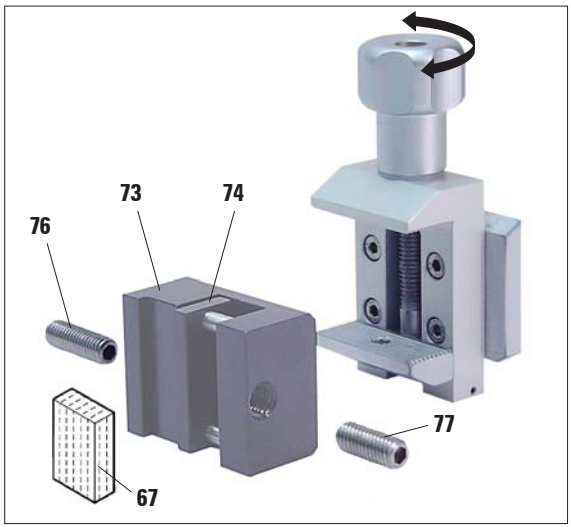


Fig. 31

Clamping of foil pieces

- Move the movable jaw (**74**) to the right as required by turning the set screw with an Allen key size 4 (**71**).
- Place the foil (**72**) between the movable jaw (**74**) and the fixed jaw (**73**).
- To clamp the foil, screw the movable jaw (**74**) against the fixed jaw (**73**) by using the Allen key.
- Insert the foil clamp (**75**) in the standard specimen clamp as shown.
- Turn the knurled screw (**66**) clockwise to clamp the foil clamp in the standard specimen clamp.

Clamping of flat, angular samples

To clamp angular samples, replace the long set screw (**76**) with the short set screw (**77**) provided with the foil clamp.

- Unscrew the long set screw (**76**) to the left with an Allen key size 4 (**71**).
- Screw the short set screw (**77**) in the hole.
- Place the sample (**67**) between the movable jaw (**74**) and the fixed jaw (**73**).
- To clamp the sample, screw the movable jaw (**74**) by turning the set screw (**77**) against the fixed jaw (**73**).
- Insert the foil clamp in the standard specimen clamp as shown.
- Turn the knurled screw (**66**) clockwise to clamp the foil clamp in the standard specimen clamp.

6.2.4 Foil clamp type 2

The foil clamp type 2 is appropriate for large foil ribbons.
It is mounted in the standard specimen clamp.

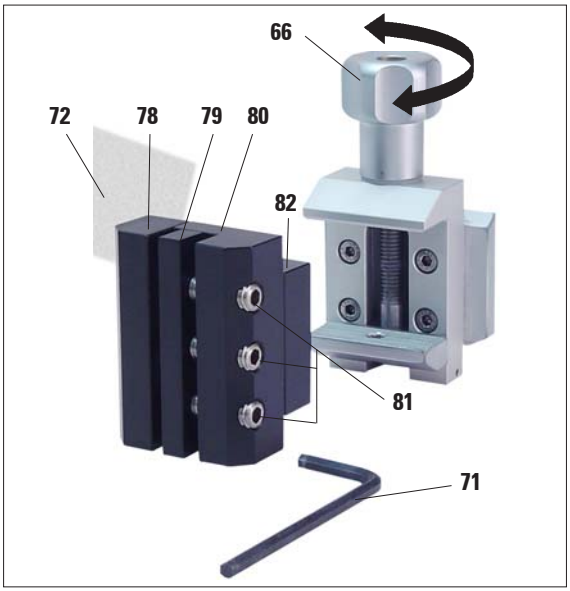
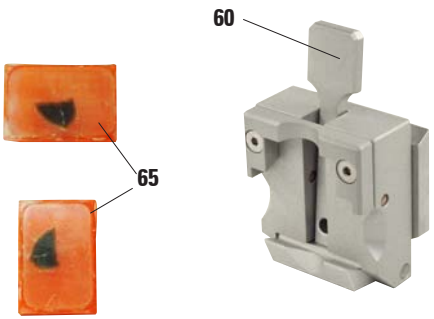


Fig. 32

- To open the jaws (**78**) and (**79**) lightly loosen the 3 screws (**81**) with an Allen key size 4 (**71**).
- Insert the foil ribbon (**72**) from behind to position it between the movable jaw (**79**) and the fixed jaw (**78**).
- To clamp the foil, first tighten the screw in the middle and then the other two screws (**81**) with the Allen key (**71**).
- Place the foil clamp (**82**) in the standard specimen clamp so that the beveled surface (**80**) on the back of the foil clamp points to the right or left.
- Turn the knurled screw (**66**) clockwise to securely clamp the foil clamp in the standard specimen clamp.

6.2.5 Universal cassette clamp

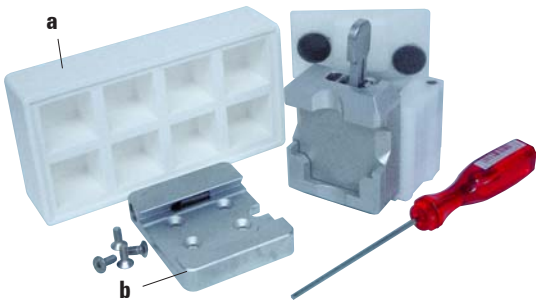


Order No. 0502 37999 Fig. 33

The universal cassette clamps (UCC) are designed for horizontal or vertical clamping of all kinds of commercial cassettes.

- Push the lever (**60**) forwards.
- Mount the cassette (**65**) horizontally or vertically as required.
- To clamp the cassette, release the lever (**60**).

Universal cassette clamp, ice-cooled



Order No. 0502 37793 Fig. 34

Use the ice-cooled UCC with the non-directional specimen holder fixture only!

- Ice cubes can be made using the included Paraflex mold (**a**).
- Quick clamping system (**b**), see page 45.

6.2.6 Super mega-cassette clamp

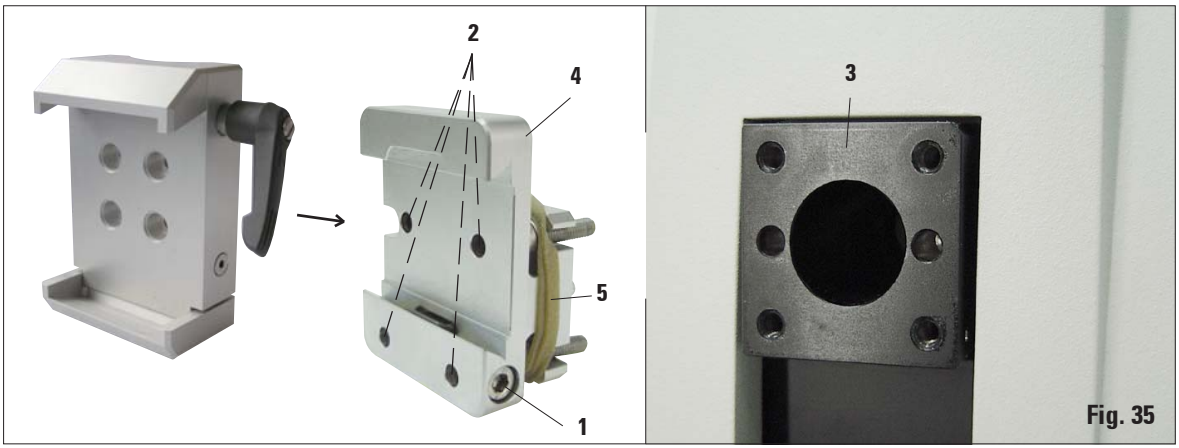


Fig. 35

Assembly of the super mega-cassette clamp

The super mega-cassette clamp should preferably be used with the rigid fixture for specimen clamps.
To do so, proceed as follows:

Remove the rubber ring (5) only after having attached the cassette clamp on the object head!

- Screw the rigid fixture for specimen clamps (**4**) onto the object head (**3**): Remove the screw (**1**), place the fixture for specimen clamps (**4**) onto the object head (**3**) from the front and tighten the screws (**2**) with an Allen key size 3.

  Next, insert the screw (**1**) from the side and briefly tighten it with an Allen key size 4.
- Insert the super mega-cassette clamp from the side on the left into the dovetail guide of the rigid fixture for specimen clamps and tighten screw (**1**).

If the directional fixture for specimen clamps is used with the rigid knife holder base, the orientation must be in position "0" and the cover for backlighting illumination must be detached. (Danger of collision if not observed!)

NEVER use the super mega-cassette clamp with backlighting illumination!

6.2.7 Holder for round specimens

The holder for round specimens is designed to accommodate cylindrical samples. Inserts for specimens of 6, 15 and 25 mm diameter are available.

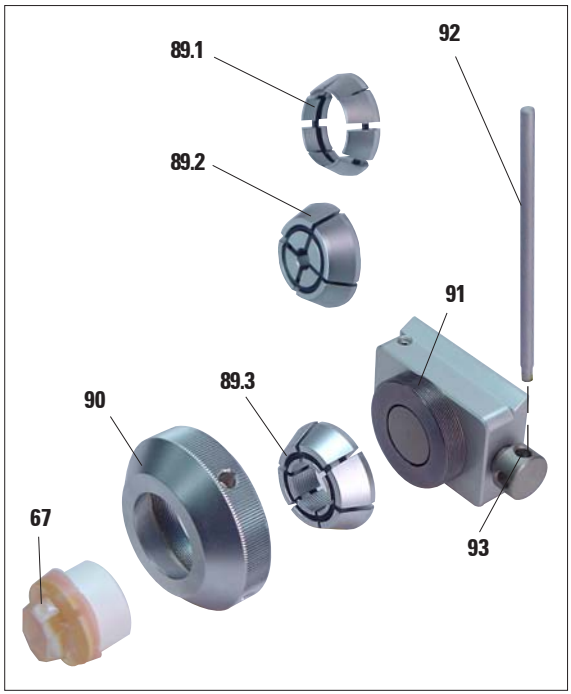


Fig. 36

- To mount the required insert (**89.1-3**) turn the clamping ring (**90**) counterclockwise and remove it.
- Place the required insert into the tension ring (**90**) and screw the tension ring onto the thread (**91**) by turning it clockwise.
- Mount the sample (**67**) and fix by turning the clamping ring (**90**) clockwise.
- To orient the inserted sample, insert the pin (**92**) into the bore (**93**) and rotate it counter-clockwise to release the clamp. You can now rotate the specimen so that the side you want faces upwards.
- To lock it in the position you have chosen, tighten the pin (**92**) by turning it clockwise.

6.3 Knife holder base and knife holder

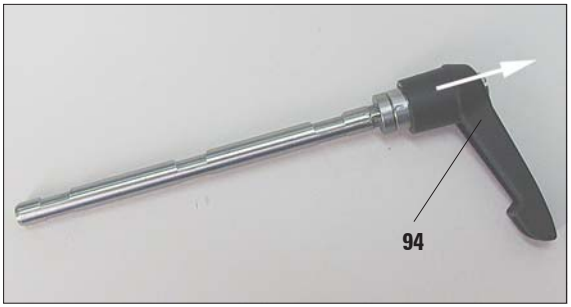


Fig. 37

The plastic handles of all clamping levers on the instrument and knife holders can be turned to the position that is most convenient for each user.

Pull the grip (**94**) out of the lever, hold it in this position, and rotate it to the desired position. It will then lock automatically when released.

6.3.1 Knife holder base, without lateral movement feature

Fig. 38

Repositioning the knife holder base

The one-piece knife holder base (rigid) (**51**) can be moved forwards and backwards on the microtome base plate.

This vertical displacement allows bringing the knife holder into the optimal cutting position in relation to the specimen.

- To release, rotate the clamping lever (**50**) on the right side of the microtome base plate counterclockwise.
- Reposition the knife holder together with the knife holder base forward or backward as appropriate.
- Secure the clamping mechanism by rotating the lever (**50**) clockwise.

6.3.2 Knife holder E/E-TC

The knife holder E-TC is designed for the Leica TC-65 tungsten carbide blades.

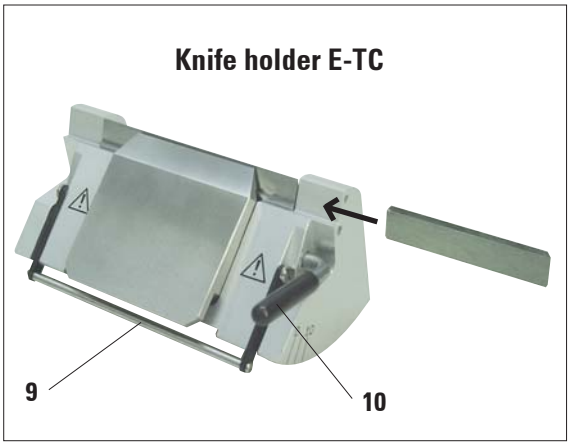


Fig. 39

Prior to inserting the blade, both knife holder and knife holder base must have been installed on the instrument!

Inserting the blades, knife holder E and E-TC

- Fold knife guard (**9**) downward.
- To insert the blade, flap the right clamping lever (**10**) forward and down.
- Carefully insert the blade from the side. Make sure that the blade is clamped parallel to the upper edge of the pressure plate.
- To clamp the blade, rotate clamping lever (**10**) back upwards.

The knife holder E is designed for conventional disposable blades from all current manufacturers. It is available in two models: one for narrow-band blades and one for broad-band blades. The knife holder has a lateral movement, so that the entire width of the blade can be used. It is also equipped with a blade ejector (9a).

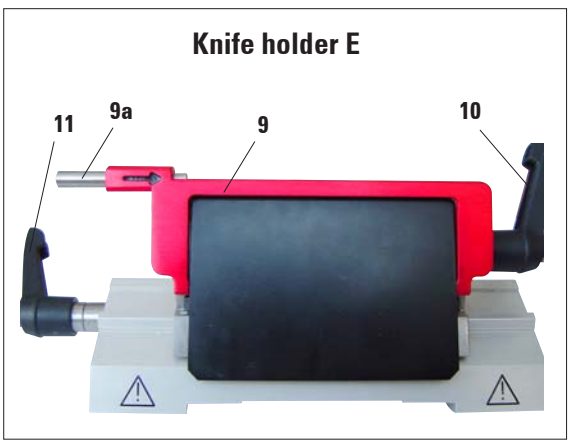


Fig. 40

The clamping levers on the knife holder are not interchangeable. The two clamping levers (10, 11) must remain in the position shown at all times, as otherwise isolated malfunctions of the knife holder can occur.
Clamping lever for the blade (10) at the right, clamping lever for the lateral displacement (11) at the left.

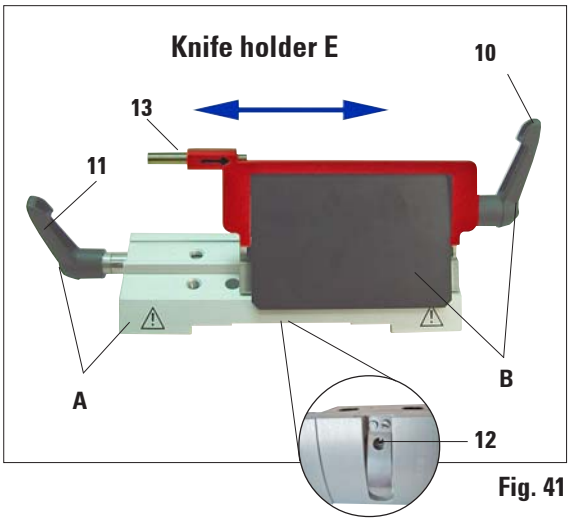


Fig. 41

Lateral displacement (only for knife holder E)

The lateral movement feature of the knife holder base enables the use of the entire length of the blade or knife, eliminating the need for re-adjusting the knife holder. The knife holder E consists of a segment arch **A** (with lever (**11**)) and the clamp mount **B** (with lever (**10**) and ejector (**13**)).

The extreme left and right positions as well as the middle position are each marked with a notch point.

- To release the clamp, rotate the lever (**11**) on the left side of the knife holder forwards.
- Move the knife holder sideways.
- To clamp, rotate the lever (**11**) back.

Note on the knife holder E:

The knife holder E is an important precision component, the quality and precise adjustment of which have a lasting effect on the entire function of the microtome. In case of malfunctions or damages to the clamp mount, it is always required to replace the clamp mount, including the pertinent clamping lever.

Leica Biosystems offers special prices for new clamp mounts in case of damages to the clamp mount after the warranty has expired.

In this way, perfect function of the device can be ensured over the course of many years.

Setting of the clamping system of the clamp mount on the segment arch

To ensure a proper sectioning result, clamp mount **B** must be securely clamped onto segment arch **A**.

The clamping is carried out using an eccentric at the lever (**11**). The clamping force is adjusted with the setscrew (**12**) on the underside of the segment arch. The setting of the clamping is carried out so that the clamping lever can be rotated to the stop with constantly increasing resistance.

Adjust the clamping with a 2.5 mm Allen key at the grubscrew (**12**) so that the lever initially "bars" when the lever is activated. Continue turning the grubscrew (**12**) a little bit (approx. $^1/_4$ turn to the left or right), then check that the lever no longer "bars", but also does not jam "heavily".

(The language CD features a short video film for this purpose.)

Knife holder E with water bath for narrow-band and broad-band blades

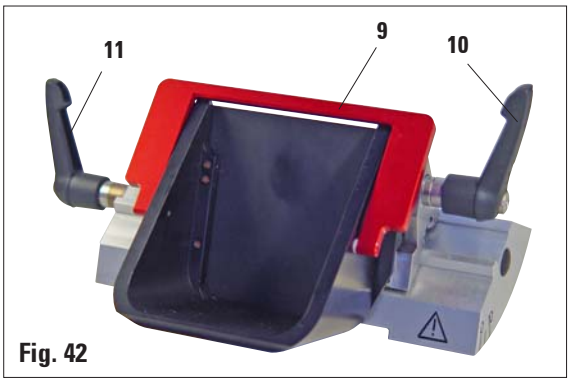


Fig. 42

Knife holder E with water bath is available for both narrow-band and broad-band blades.

The knife guard on knife holder E consists of a red foldaway handle (**9**). To cover the cutting edge, fold the knife guard handle (**9**) upwards as illustrated in Figure.

The clamping levers on the knife holder are not interchangeable. The two clamping levers (10 and 11) must remain in the position shown at all times, as otherwise isolated malfunctions of the knife holder can occur.
Clamping lever for the blade (10) at the right, clamping lever for the lateral displacement (11) at the left.

Use

Floating thin paraffin sections (for example, for subsequent immunostaining procedures) on the surface of the water. Flat paraffin sections can be removed from the surface of the water using glass slides.

Fig. 43

The vessel is filled with water up to the blade. After trimming, remove the section waste from the tray and create the sections to be prepared. The sections floating on the surface of the water can be removed using the glass slide.

6.3.3 Knife holder N/NZ

The knife holders N and NZ are appropriate for standard steel and tungsten carbide knives, profile c and d, up to 16 cm long. The integrated height adjustment feature allows you to also use knives that have been resharpened numerous times.

Mounting the knife support bar

- Push knife guard (**8**) to the center.
- Set the knife support bar (**46**) onto the height adjustment screws (not visible) in the position shown. The flat ends of the height adjustment screws must be located in the slots at each end of the knife support bar.

Prior to inserting the knife, both knife holder and knife holder base must have been installed on the instrument!

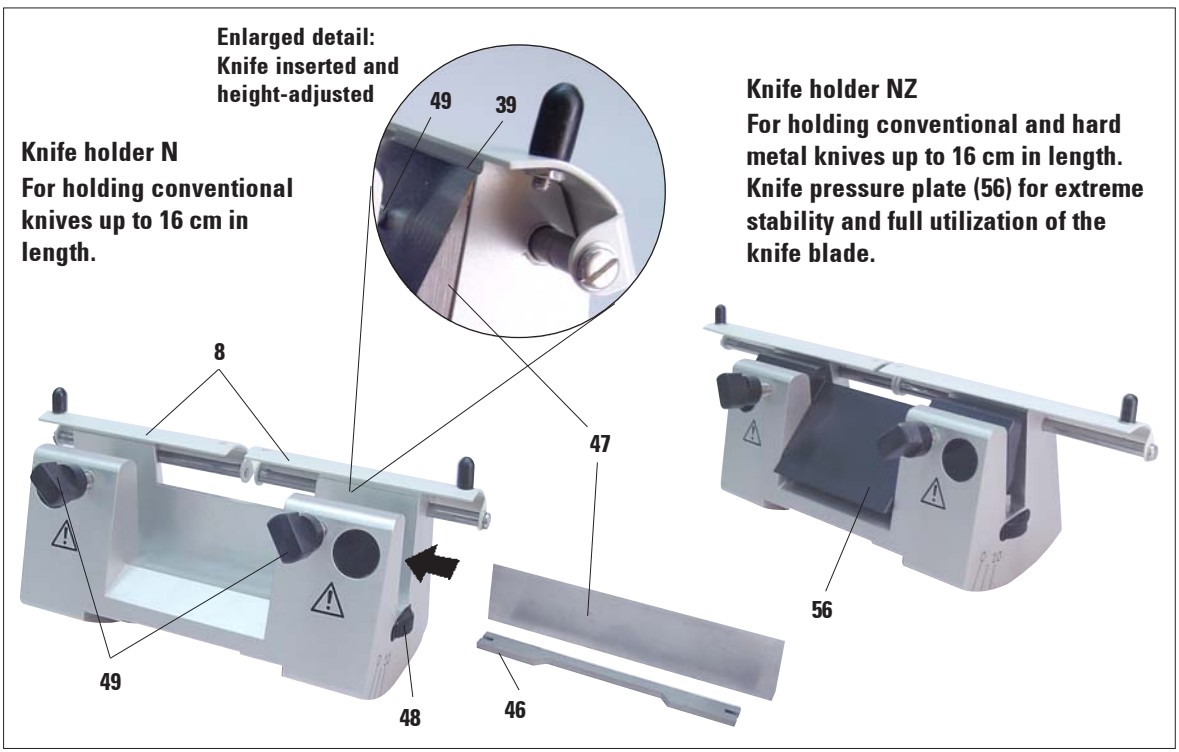

Enlarged detail:
Knife inserted and height-adjusted
49
39
Knife holder N
For holding conventional knives up to 16 cm in length.
Knife holder NZ
For holding conventional and hard metal knives up to 16 cm in length. Knife pressure plate (56) for extreme stability and full utilization of the knife blade.
8
47
49
48
46
56

Fig. 44

Inserting the knife

- Rotate the knurled nuts (**48**) on the right and left of the knife holder forward in opposite directions, lowering the knife support bar to the lowest possible position, thus ensuring that the knife edge will not be damaged when inserting the knife.
- Unscrew the clamping screws (**49**) as far out as possible (rotate counterclockwise).
- Hold the knife (**47**) at the knife back and carefully insert it in the holder from the side as shown with the cutting edge facing upward.

Knife height adjustment

When adjusting the clearance angle, the knife edge should be positioned as exactly as possible in the actual center of rotation of the knife holder. The lay-on edge (**39**) of the rear clamping chucks serves as a reference position for correct knife height adjustment. The knife edge should be parallel with the locating edges.

- Rotate the knurled nuts (**48**) uniformly and backwards until the knife blade is parallel to the lay-on edge (**39**) (see detailed illustration) of the rear clamping chucks.
- To clamp the knife (**47**) evenly screw the two knife clamping screws (**49**) inward (rotate clockwise).

Lateral repositioning of the knife

- Push knife guard (**8**) to the center.
- Loosen the clamping screws (**49**) by turning them counterclockwise.
- Push the knife (**47**) to the left or right as required.
- To clamp the knife (**47**), always tighten the clamping screw (**49**) first which is located on the side to which the knife has been repositioned by turning it clockwise.

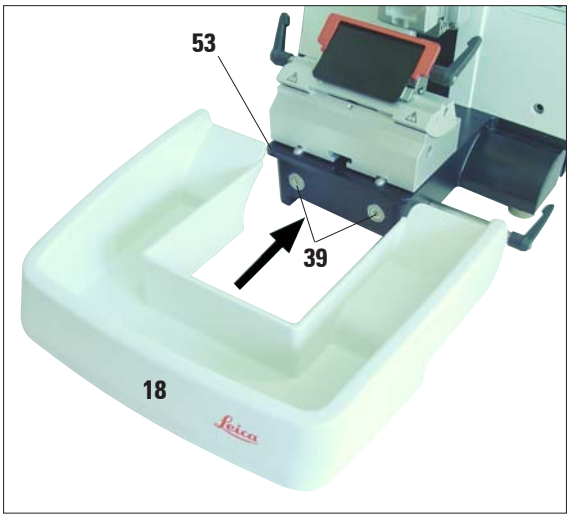


Fig. 45

6.4 Section waste tray

- Push the section waste tray (**18**) from the front to the microtome base plate (**53**) until it is held in place by the two magnets (**39**) (on the front of the microtome base plate).
  To remove the section waste tray, lift it slightly and pull it off towards the back.

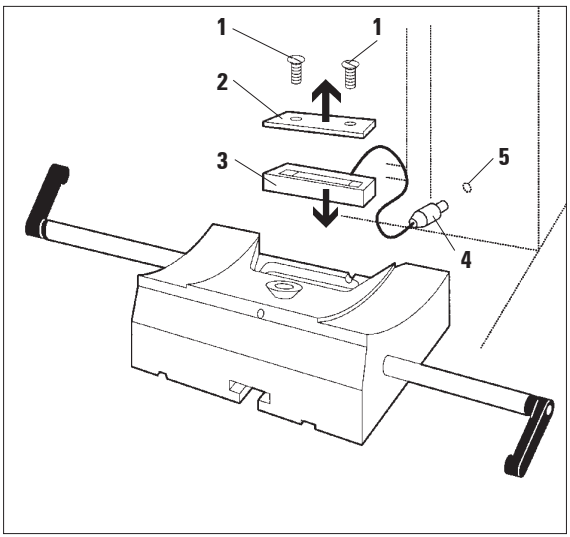


Fig. 46

6.5 Backlighting

The backlighting is inserted at the front into the one-piece knife holder base.

- Remove the two screws (**1**) using a slotted screwdriver and then remove the cover plate (**2**).
- Insert the backlighting (**3**) in the recess at the rear of the knife holder base.
- Connect the plug (**4**) of the backlighting to the socket (**5**) on the microtome.

The backlighting illuminates once the microtome is turned on with the mains switch.

NEVER use the backlighting illumination with the super mega-cassette clamp!

Fig. 47

6.6 Tray

The tray is mounted on the hood of the microtome so that the small feet on the underside fit into the cutouts on the hood.
It is for storage of the utensils used during sectioning as well as the sectioned specimens.

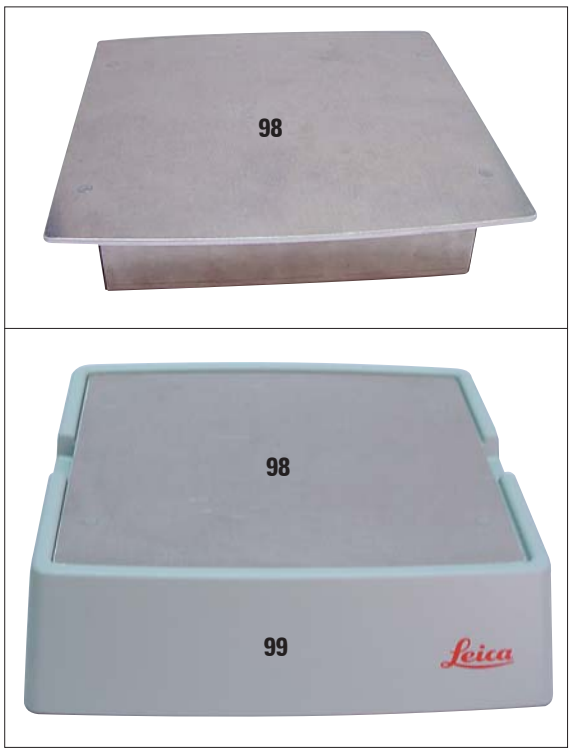


Fig. 48

6.7 Freezer pack

The freezer pack consists of the freezer plate (**98**) and the insulation jacket (**99**). It is for cooling (or keeping cold) paraffin specimens. Up to 35 standard cassettes can be cooled at the same time. The specimens require approx. 20 min. for being cooled from room temperature (approx. 20 °C) to "sectioning temperature".
The cooling performance depends on the ambient temperature and the volume of the specimens being cooled.
The insulation jacket can be placed on the hood of the microtome in the same manner as the tray, or it can be placed next to the instrument.

When using the freezer pack on the instrument the tray (Fig. 44) must be removed.

- Remove the freezer plate from the insulation jacket and place it in a deep freezer, ideally overnight (but for at least six hours) at approx. -23 °C.
- Reassemble the freezer plate and insulation jacket and place them on the bench or the instrument.

6.8 Universal microscope carrier

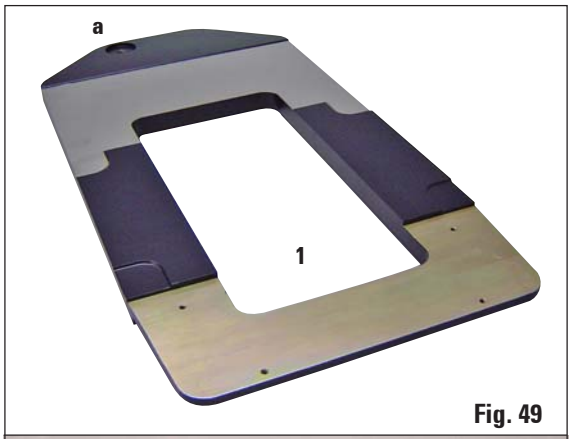


Fig. 49

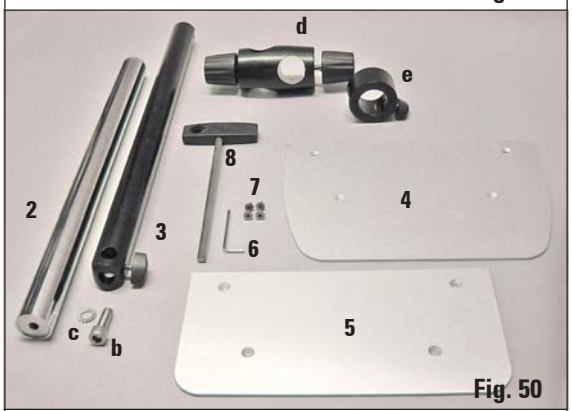


Fig. 50

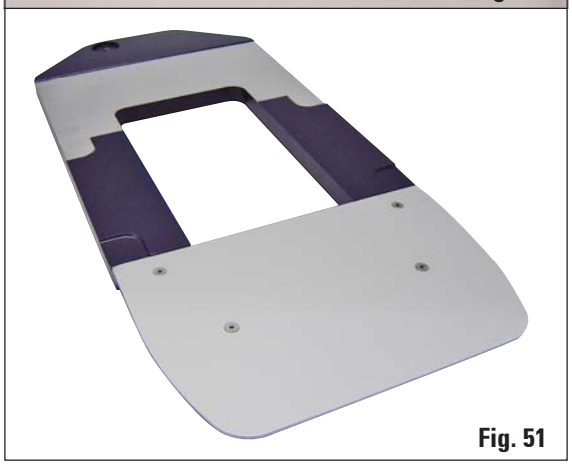


Fig. 51

Unpack all accessories in the package and check for completeness.

1 - Baseplate with drilling (a)
2 - Vertical column with size 8 cap screw (b) and lock washer (c)
3 - Horizontal arm with cross-member (d) and support ring (e)
4 - Support plate, large (for RM2235, RM2245 and RM2255)
5 - Support plate, small (for RM2265)
6 - Allen key, size 3
7 - 4 countersunk screws to install support plate
8 - Allen key, size 8

Assembling the universal microscope carrier

1. Attach baseplate

- Select the large (**5**) or small (**4**) support plate, depending on the microtome to be used.
- Attach the support plate to the baseplate with the included 4 countersunk screws (**7**) using the Allen key size 3 (**6**).

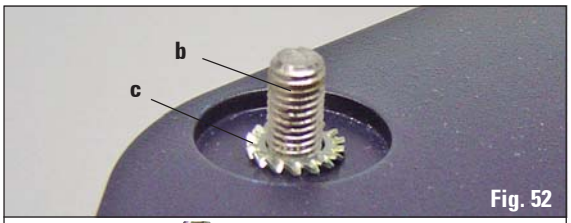


Fig. 52

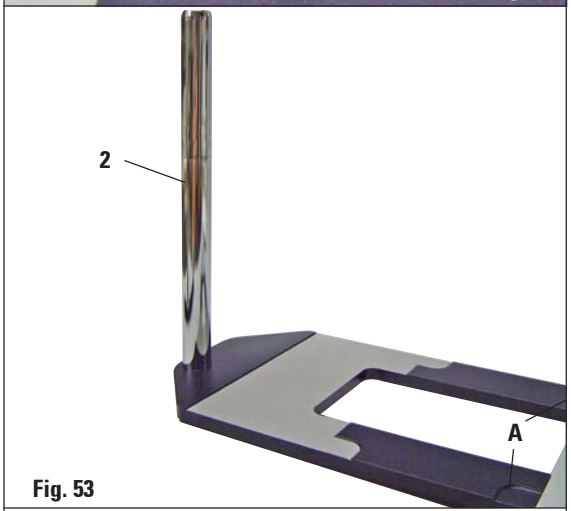


Fig. 53

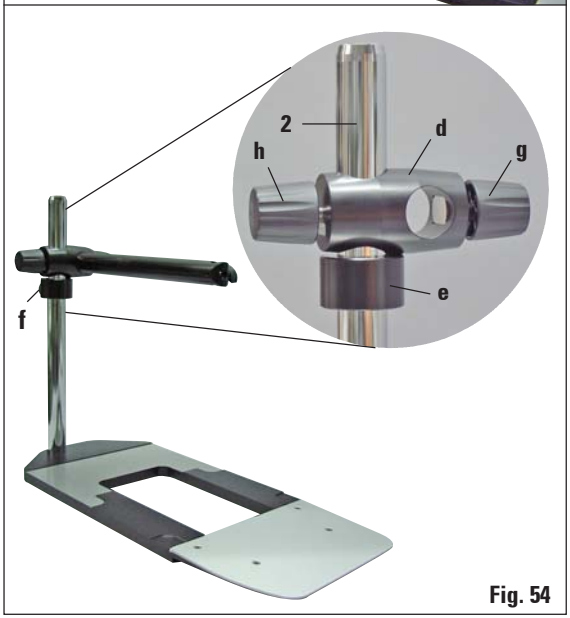


Fig. 54

2. Attach vertical column

- Insert the cap screw (**b**) into the hole of the baseplate from below. Place the lock washer (**c**) on the cap screw from above.
- Thread the silver vertical column (**2**) onto the baseplate from above and tighten with the Allen key size 8.

The lock washer must be positioned between the baseplate and vertical column to prevent unintentional turning of the column.

Extreme danger of tipping! After installing the vertical column, immediately place the microtome onto the baseplate so that the front feet of the microtome are positioned in the shallow recesses (A).

3. Attach horizontal arm

- Slide the support ring (**e**) onto the vertical column and position it so that the lock nut (**f**) is facing to the back. Tighten the lock nut.
- Slide the cross-member (**d**) onto the column. Ensure that the lock screw (**g**) is facing to the right of the baseplate. The horizontal arm must be centered over the microscope.
- Slide the horizontal arm (**3**), flat side facing the lock screw (**g**), into the cross-member (**d**) and tighten.

For more information on connecting and using the microscope, magnifying lens or cold-light source, please see the appropriate manual.

6.9 Magnifying lens

Fig. 55

Fig. 56

Fig. 57

The magnifying lens provides a 2x magnification and can be used with all Leica 2200 series rotary microtomes.

- Open the screw (**3**) on the horizontal arm of the microscope carrier in a counterclockwise direction.
- Insert the silver connection piece (**1**) as far as it will go. Tighten the screw (**3**).
- The adapter (**2**) allows a fiber-optic light guide to be installed.

- Adjust the position of the magnifying lens to the specimen being processed.

  The magnifying lens can be swiveled completely to the side if necessary.

Always protect the magnifier glass from exposure to direct sunlight! Exposure to sunlight may cause a burning glass effect. Danger of fire!

- Use the provided protective cap (**4**) to cover the magnifying lens.

6.9 Cold light source

Fig. 58

6.10 Fiber-optic light guide

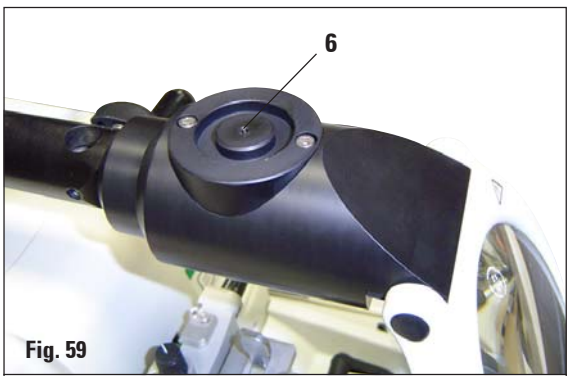


Fig. 59

Fig. 60

The cold light source may be operated at the power supply voltage specified on the identification label (on the underside of the instrument) only.

- Connect the power cable (**1**) to the connecting jack on the rear of the device.
- Plug the power plug into the power socket.

Carefully read the instruction manual provided separately before use!

- Attach the fiber-optic light guide (**2**) to the adapter of the magnifying lens and secure it in place in the bore (**6**) using the screw (**5**).
- Pull off the protective cap (**3**) from the end of the fiber-optic light guide and keep it in a safe place.
- Insert this end into the opening provided (**4**) until it engages with a slight click.
- Switch on the Cold light source using the power switch (**7**).
- Remove the protective caps (**8**) and align the light guide with the specimen.

Fig. 62, Leica rotary microtome with installed optional accessories: magnifying lens and fiber-optic light guide

6.11 Ordering information

Fixture for specimen clamps, rigid, silver	14 0502 38160
Fixture for specimen clamps, directional, silver	14 0502 38949
Fixture for specimen clamps, directional, with 2 zero point indicators, silver	14 0502 37717
Quick clamping system, complete	14 0502 37718
Knife holder-base rigid, silver	14 0502 37962
Knife holder N RM22xx, silver	14 0502 37993
Knife holder NZ RM22xx, silver	14 0502 37994
Knife holder E narrow band RM22xx, silver, with ejector	14 0502 40508
Knife holder E broad band RM22xx, silver, with ejector	14 0502 40509
Knife holder E narrow band Run-off tray RM22xx	14 0502 38961
Knife holder E broad band Run-off tray RM22xx	14 0502 39114
Knife holder E-TC RM22xx silver	14 0502 37997
Standard specimen clamp with adapter 50x60, silver	14 0502 38005
Standard specimen clamp with adapter 40x40, silver	14 0502 37998
V-insert for Standard specimen clamp, silver	14 0502 38000
Universal cassette clamp, with adapter (silver)	14 0502 37999
Universal cassette clamp - ice-cooled	14 0502 37793
Megaclamp assembly RM22xx, silver	14 0502 38967
Foil clamp - type 1, black	14 0402 09307
Foil clamp - type 2, black	14 0402 26922
Round specimen holder, silver	14 0502 38001
Round specimen holder with adapter and 3 clamping rings, silver	14 0502 38002
Clamping ring for round specimen holder, d = 6 mm	14 0356 08322
Clamping ring for round specimen holder, d = 15 mm	14 0356 09200
Clamping ring for round specimen holder, d = 25 mm	14 0356 08320

EM specimen holder fixture, black	14 0502 29968
EM univ. specimen holder	14 0356 10868
EM flat specimen holder	14 0355 10405
Special wrench f. EM holder	14 0356 10869
Universal microscope carrier, complete	14 0502 40580
Magnifying lens assembly	14 0502 42790
Cold light sources	
Leica CLS 100X, 100-120V/50-60Hz	14 0502 30214
Leica CLS 100X, 230V/50-60Hz	14 0502 30215
Leica CLS 100X, 240V/50-60Hz	14 0502 30216
Fiber-optic light guide	14 0502 30028
Backlighting assembly	14 0502 38719
External power supply, complete	14 0500 31244
Handrest for waste tray	14 0502 38770
Cooling device assembly	14 0502 38325
Section waste tray, large	14 0502 37931
Section waste tray, small	14 0503 39060
Demo Box RM22xx series	14 0502 38930
Tray	14 0502 37932
"Leica" brush w/magnet	14 0183 40426

7.1 Instrument malfunctions

Certain instrument malfunctions appear on the 3-digit LED display or are indicated through illuminated LED's on the control panel.

7.1.1 Error reports

Indication E1

If this message follows the software version indication after switching on the instrument, a loss of all parameters has occurred.

- Press any key.

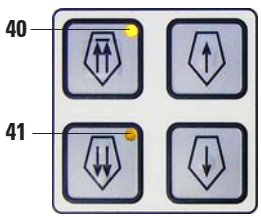
All parameters are then set back to the default values.

- Now all settings must be checked to see if the previously entered values are still correct.
  The values may have to be reentered.

You can continue with your normal working routine.

If E-1 appears repeatedly when switching the instrument on, the lithium battery may need replacement (service life approx. 7 years).

- Proceed as described above.
- Work normally after checking the settings.
- Have the battery replaced by Leica service as soon as possible.



LEDs (40), (41) in the coarse feed buttons are lit at the same time.

This indicates a defect in the detection of the **STOP** and **HOME** positions of the object head.

The problem can only be resolved by customer service.

7.1.2 Malfunctions, possible causes and troubleshooting

Following is a list of the most common problems which can arise while working with the instrument, along with possible causes and troubleshooting procedures.
If the malfunction cannot be remedied with any of the options listed in the table, or the problem occurs repeatedly, inform the Leica Service Support immediately.

Problem	Possible cause	Corrective action
• **No display; no reaction to buttons pressed after the instrument is switched on.**	1. The power cable is not connected correctly. 2. Power fuses are defective. 3. The cable of the control panel is not connected correctly. 4. The voltage selection switch is set incorrectly.	1. Check the connection of the power cable. 2. Replace power fuses (see 8.3). 3. Check the connection of the cable to the control panel. 4. Check the voltage setting and correct it if necessary (see Chapter 4.4).
• **Feed motion no longer occurs.**	1. The end of the residual path has been reached. 2. The specimen was already within the residual path when the instrument was switched on.	1. Select the trim mode by pressing **TRIM/SECT**. Then return the specimen using the coarse feed button. Then retract the specimen using the coarse feed button. 2. Follow the procedure in Item 1.
• **The specimen in the residual path area cannot be returned using the coarse feed buttons.**	1. **STEP** mode is still active (LED in **SECT** button lights up).	1. Press the **TRIM/SECT** button to switch to trimming mode. Return the specimen using the coarse feed button.

7.2 Possible faults

Problem	Possible cause	Corrective action
1. Thick/thin sections The sections alternate between being thick and thin. In extreme cases, there are no sections whatsoever.	• Insufficient clamping of blade, knife holder, specimen or orientation.	• Check the clamping positions and repeat the clamping process
	• The blade is dull.	• Laterally displace the knife holder or insert a new blade.
	• The pressure plate is damaged or incorrectly adjusted.	• Insert a new pressure plate or use a new knife holder.
	• Clearance angle of the knife/ blade too small.	• Methodically experiment with larger clearance angle settings until you have found the optimum angle.
2. Section compression The sections are very compressed, show folds or are squeezed together.	• The blade is dull.	• Use another area of the blade or a new blade.
	• The specimen is too warm.	• Cool the specimen before sectioning.
	• The sectioning speed is too fast.	• Reduce the sectioning speed.
3. "Stripes" in sections For knife holder E	• There is an accumulation of paraffin on the rear pressure plate of the knife holder.	• Remove paraffin from this area on a regular basis.
4. Noises during sectioning The knife "sings" when sectioning hard specimens. The sections show scratches or chatter marks.	• The sectioning speed is too fast.	• Select a slower sectioning speed.
	• The clearance angle is too wide.	• Methodically reduce the clearance angle setting until you have found the optimum angle.
	• Insufficient clamping of specimen clamp and/or knife holder.	• Check all screw and clamp connections on the specimen holder system and the knife holder. If necessary, tighten the levers and screws.
5. High blade consumption	• Too great of a sectioning force was applied.	• Adjust the sectioning speed and/or section thickness when sectioning. Select a thinner section.

8. Cleaning and maintenance

8.1 Cleaning the instrument

Always remove the knife / blade before detaching the knife holder from the instrument.
Always put the knives back into the knife case when not in use!
Never place a knife anywhere with the cutting edge facing upwards and never try to catch a falling knife!
When using cleaners, comply with the safety instructions of the manufacturer and the labor-safety regulations of your laboratory!
When cleaning the outer surfaces, do not use xylene, scouring powders or solvents containing acetone or xylene. Xylene or acetone will damage the finished surfaces!
Ensure that liquids do not enter the interior of the instrument during cleaning!

Before each cleaning carry out the following preparatory steps:

- Raise the specimen clamp to the upper end position and activate the handwheel lock.
- Switch the unit off and unplug it.
- Remove the blade from the knife holder and insert it in the receptacle at the bottom of the dispenser, or remove the knife from the knife holder and put it back in the knife case.
- Remove knife holder base and knife holder for cleaning.
- Remove the specimen from the specimen clamp.
- Remove section waste with a dry brush.
- Remove specimen clamp and clean separately.

Instrument and outside surfaces

If necessary, the varnished outside surfaces of the control panels can be cleaned with a mild commercial household cleaner or soap water and then be wiped with a cloth.
To remove paraffin residue, xylene substitutes, paraffin oil, or paraffin removers such as "Para Gard" (Polysciences) can be used.
The instrument must be completely dry before it can be used again.

Cleaning the knife

Always wipe the knife from the back of the knife to the cutting edge. NEVER wipe in the opposite direction - risk of injury!

Clean using an alcohol-based solution or acetone.

Knife holder E

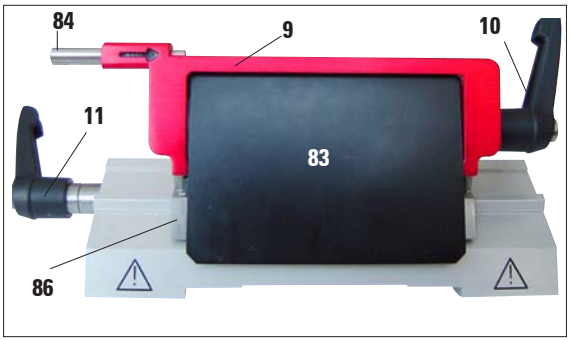


Fig. 61

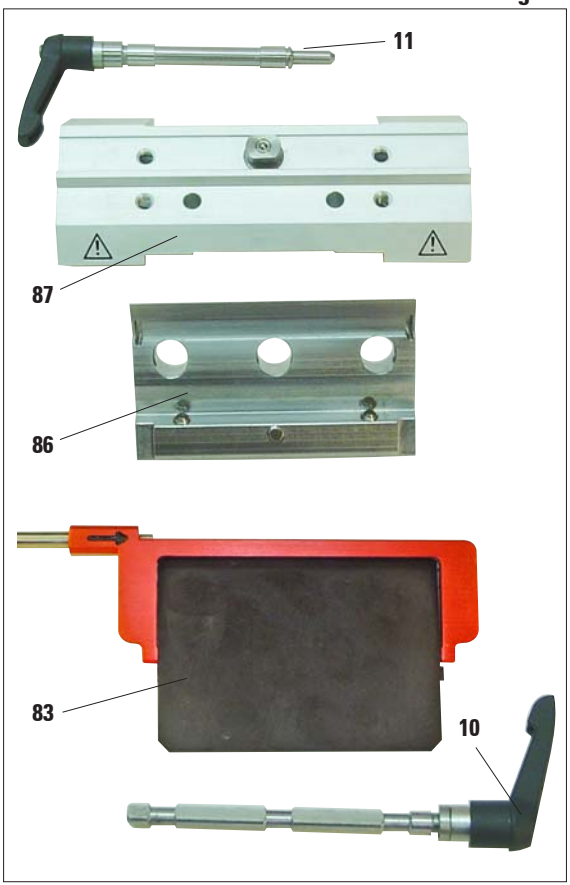


Fig. 62

Take the knife holder apart for cleaning. To do so, proceed as follows:

- Fold the knife guard (**9**) and ejector (**84**) downward.
- Rotate the clamping lever (**11**) of the lateral displacement forwards and pull it out sideways.
- Push the knife holder base plate (**86**) with the pressure plate (**83**) until it can be removed from the segment arch (**87**).
- Rotate the blade clamping lever (**10**) downward and pull it out sideways.
- Remove pressure plate (**83**).
- Clean all parts of the knife holder.

If several knife holders are cleaned at the same time, the parts must not be mixed up!

For cleaning and removal of paraffin, do not use xylene or cleaning fluids containing alcohol (e.g. glass cleaner).

- Dry knife holder and reassemble.
- After cleaning the moving parts, apply a thin coat of drive part oil to them (see also Chapter 8.2.3).
- When installing the pressure plate (**83**), ensure that the upper edge is parallel to and level with the rear edge of the knife holder base (**86**) (see also Fig. 38, Page 45).

Universal cassette clamp

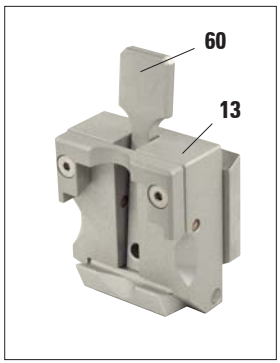


Fig. 63

- Detach cassette clamp (**13**) for a thorough cleaning, removing all paraffin residues.
- For cleaning, do not use xylene. Use xylene substitutes or paraffin removers such as "Para Gard".
- The cassette clamp (**13**) can also be placed in an oven heated to a maximum of 65 °C, until the liquid wax escapes.
- Remove paraffin residues with a dry cloth.
- After such a cleaning procedure in an oven, always be sure to lubricate the axle and spring of the clamping lever (**60**) (see also chapter 8.2.3).

8.2 Maintenance

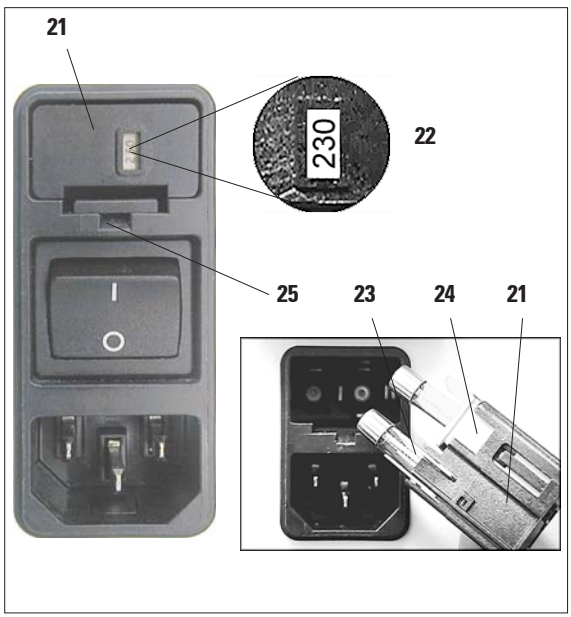


Fig. 64

8.2.1 Replacing fuses

Switch the unit off and unplug it. Use only the supplied replacement fuses. Both fuses must have the same rating (check the imprint!).

- Insert a small screwdriver into the cutout (**25**) and carefully pry out the insert.
- Remove the voltage selector housing (**21**) together with the fuses (**23**).
- Remove the fuses. While doing so, leave the voltage selector switch block (**24**) in the housing.
- Replace defective fuses and reinstall the voltage selector into the instrument.
- Check that the correct voltage value is displayed in the viewing window (**22**).

8.2.2 Maintenance instructions

Only authorized and qualified service personnel may access the internal components of the instrument for service and repair!

The instrument is basically maintenance-free.

To ensure trouble-free operation of the instrument over a long period of time, the following is recommended by Leica:

1. Thoroughly clean the instrument on a daily basis.
2. Enter into a service contract at the latest at the end of the warranty period. For more information, please contact your local Leica technical service center.
3. Have the instrument inspected on a regular basis by a qualified service technician authorized by Leica.

   The intervals depend on how heavily the instrument is used.

We recommend the following inspection intervals depending on the general workload of the instrument as defined in the three categories listed in the table:

	Category I	**Category II**
Number of sections per day:	> 8.000 sections per day	< 8.000 sections per day
Workload (hours per day):	> 5 hours per day	≤ 5 hours per day
Sectioning speed:	Predominantly high sectioning speed	Slow to medium sectioning speed
Specimen material:	Working with soft and hard specimens	Predominantly soft specimen material
Maintenance:	Every 12 months	Every 24 months

Note for inspection

- When the instrument reaches approx. 2 million performed strokes, the code **SEr** always appears for approx. 3 seconds in the three-digit display when the **TRIM/SECT** button is pressed (switching between trimming and sectioning mode).
  This is a reminder that the instrument must be inspected by an authorized Leica service technician, regardless of how heavily the instrument has been used.

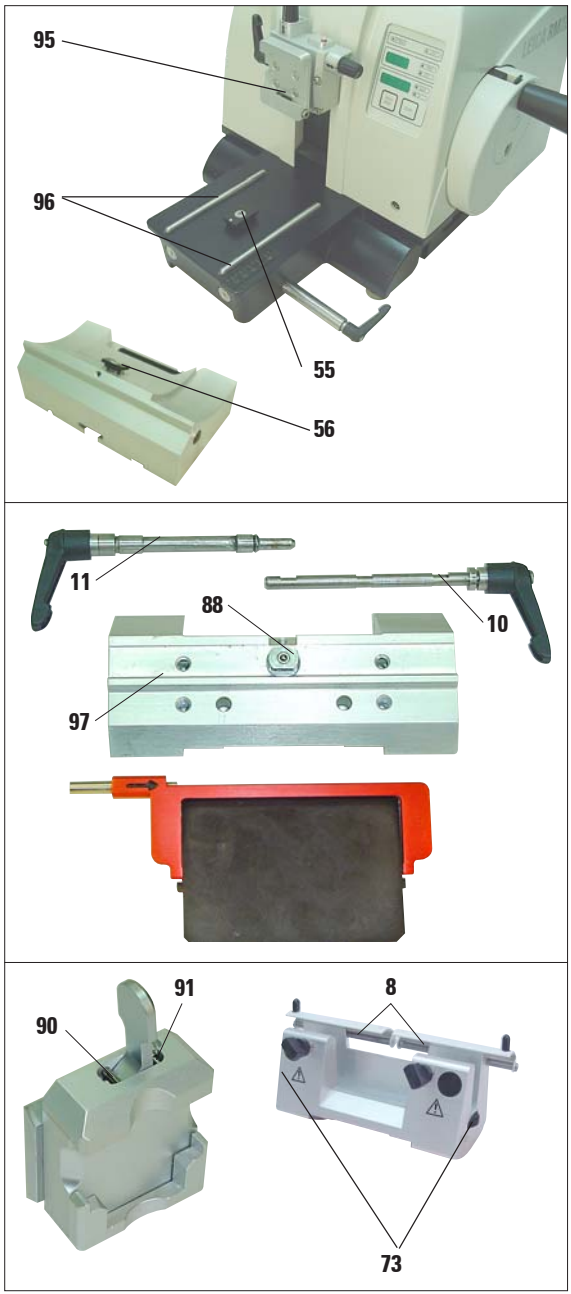


Fig. 65

8.2.3 Lubricating the instrument

Once a month, lubricate the following parts with the included drive parts oil No. 405 (1 - 2 drops are enough).

Instrument and specimen holder:

- The clamping key (**95**) of the quick clamping system.
- The T-piece (**55**) on the microtome base plate.
- Guide rails (**96**) for the knife holder base on the microtome base plate.
- The T-piece on the knife holder base (**56**).

Knife holder E:

- Clamping lever (**11**) for the lateral displacement.
- T-piece (**88**) and guide (**97**) of the knife holder for the lateral displacement.
- Clamping lever (**10**) for the blade.

Knife holders N and NZ:

- Sliding surfaces of the finger guard (**8**).
- Knurled nuts (**73**) for measuring height adjustment.

Universal cassette clamp:

- Shaft (**90**) and flat coil spring (**91**) of the clamping lever of the cassette clamp. After lubrication, move the lever back and forth several times.

Warranty

Leica Biosystems Nussloch GmbH guarantees that the contractual product delivered has been subjected to a comprehensive quality control procedure based on the Leica in-house testing standards, and that the product is faultless and complies with all technical specifications and/or agreed characteristics warranted.

The scope of the warranty is based on the content of the concluded agreement. The warranty terms of your Leica sales organization or the organization from which you have purchased the contractual product shall apply exclusively.

Service information

If you are in need of technical customer service or spare parts, please contact your Leica representative or the Leica dealer where you purchased the instrument.

Please provide the following information:

- Model name and serial number of the instrument.
- Location of the instrument and name of the person to contact.
- Reason for the service call.
- Delivery date.

Decommissioning and disposal

The instrument or parts of the instrument must be disposed of according to existing local applicable regulations.
Special attention should be paid to the lithium cell of the electronic circuit board!

CE

EC Declaration of Conformity

We herewith declare, in exclusive responsibility, that the

Leica RM2245 – Rotary Microtome

was developed, designed and manufactured to conform with the

- Directive 2006/95/EC of the European Parliament and of the Council (Low Voltage)
- Directive 2004/108/EC of the European Parliament and of the Council (electromagnetic compatibility)
- Direktive 98/79/EC of the European Parliament and of the Council (in-vitro diagnostic medical devices)

The following harmonized standards were applied:

- **EN 61010-1: 2001**
  Safety requirements for electrical equipment for measurement, control and laboratory use
  Part 1: General requirements
- **EN 61326: 2006**
  Electrical equipment for measurement, control and laboratory use -
  EMC requirements -
  Part 1: General requirements
- **DIN EN 61010-2-101: 2002**
  Safety requirement for electrical equipment for measurement, control and laboratory use
  Part 2-101: Particular requirements for in vitro diagnostic (IVD)
- **EN 14971: 2007**
  Medical devices - Application of risk management to medical devices
- **EN 591: 2001**
  Instruction for use for in vitro diagnostic instruments for professional use

In addition, the following in-house standards were applied:

- **DIN EN ISO 9001: 2000.**
  Quality management systems - Requirements

Leica Biosystems Nussloch GmbH
Postfach 1120
D-69222 Nussloch
May 15, 2008

Anne De Greef-Safft
President Biosystems Devision

- Administrative Measures on the Control of Pollution Caused by Electronic Products -

部件名称 Name of the part	有毒有害物质或元素 Hazardous substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr^{6+})	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板 printed circuit boards	X	O	O	O	O	O
电子元器件 electronic components	X	O	O	O	O	O
机械部件 mechanical parts	X	O	O	X	O	O
光学元器件 optical components	X	O	X	O	O	O
电缆 cables	O	O	O	O	X	X
光源 light sources	O	X	O	O	O	O

o： 表示该有毒有害物质在该部件中的含量均在SJ/T 11363-2006标准规定的限量要求 以下。
Indicates that the concentration of the hazardous substance in all materials in the parts is below the relevant threshold of the SJ/T 11363-2006 standard.

x： 表示该有毒有害物质至少在该部件的某一材料中的含量超出SJ/T 11363-2006标准规定的限量要求。
Indicates that the concentration of the hazardous substance of at least one of all materials in the parts is above the relevant threshold of the SJ/T 11363-2006 standard.

Note: The actual product may or may not include in all the part types listed above